THE BRICKBUILDER

VOL. III. BOSTON, MARCH, 1894. No. 3.

GOTHIC ARCHITECTURE IN BRICK.

From Chabat's "Brick and Terra-Cotta."

ITALIAN architecture of the mediæval period does not present in its development the abrupt changes which we see wrought in certain other countries; the change from one characteristic form to another is made with more caution. If we would consider buildings in which the semicircular is everywhere replaced by the pointed arch, we must turn to Northern Italy to collect the greatest number of examples of the use of terra-cotta. In this region, where the soil is so rich in deposits of clay, the architects understood the advantage of this material as compared with stone, in the way of cheapness and its adaptability to modelling. Admitted, that clay does not make possible in terra-cotta decoration the finish within reach of the sculptor's chisel, on stonework, it nevertheless is adequate for every general effect, and especially so when it is not desired to obtain simply a collection of fine and exact details, but a vigorous sketch, harmonious, and consequently capable of producing a strong impression.

These qualities we find united in certain edifices in Italian cities; Pavia, for example, contains some very remarkable brick buildings of the fourteenth century. The church of Santa Maria del Carmine, built in 1373, is of brick, with a foundation of stone; the joints of the masonry are very carefully made, a fine quality of mortar being used; the projections of the ornamented parts, such as cornices, belt courses, and arch moulding, are handled with such nicety, the sculptures are worked with so much taste, that the effect upon the spectator is striking. The entablature of the gabled façade especially merits attention. It shows (Fig. 1) in its arcade motive of decoration, its arabesque, its rope mouldings, *et cetera*, a very beautiful use of moulded terra-cotta. The columns and piers of the interior are also brick, laid with so much care that the cylindrical form of the shafts appears perfect; one can scarcely distinguish the joints.[1]

FIG 1.

This building presents in its entirety a great uniformity of color, which is due to the exclusive use of terra-cotta. It is different with the Castle of Pavia, built by the Visconti, two great towers and some arches of which now remain; brick and terra-cotta entered largely into the construction and decoration of this building, but the columns, capitals, and some cornices were stone. Fresco imitations of marble added, by their brilliant colors, to the variety of the decoration.

If the brick buildings of the Middle Ages are not so important in other provinces of Italy as they are in Lombardy, we find nevertheless in a large number of cities, such as Lucca, Pisa, Siena, Ferrara, Ravenna, Bologna, Rome, etc., buildings of this kind possessing the greatest interest. We cannot mention them all; only some few can we describe.

At Pisa, the tower of the Vicolo Santa Margherita has arches of modelled terra-cotta; another tower named from the Via delle belle Torri, carries a brick frieze which can still be seen at the corner of the Vicolo del Cuore. In this same city, upon the façades of old houses, notably the old buildings surrounding the church of San Michele, one finds, framed by courses of brick, old escutcheons of terra-cotta which "recall, in the midst of the ravages of the time, the clever touch of the old Pisan sculptors."[1]

At Lucca, in the Guinigui Palace, which dates from the thirteenth century, the columns of the entrance or vestibule are alone of stone; the rest is brick.

As in Pisa, Lucca, Pistoja, so in the old town of Siena are found buildings where terra-cotta, brick, and marble are combined skilfully, considered both as to effect and economy. We cannot insist too much upon the advantages of this kind of architecture, suitable for countries where stone is scarce, and which offers at the same time more gayety than brick alone. The Buonsignori palace, which is supposed to have been built at the end of the thirteenth century,[2] attracts attention, in Siena, by the use in its construction of brick and terra-cotta, mixed with stone. All the pointed arches have a peculiarity of construction which it would be well to describe here. The joints of the voussoirs do not converge, as ordinarily, to centres of the segments of the arch, but to the intersection of the axis of the opening with the base line of the arch. These bricks are 10.4 inches long by 2.36 inches thick, and have been ground to arch shape. The substructure of the building is brick of extreme hardness, laid with the greatest care; their red color and even surface are very well preserved. Beneath the first-story windows there is a decorative feature with arcade *motif* in terra-cotta, supported by consoles which alone are built into the wall, while the pieces of brick, of slight thickness, forming the arcade *motif* are simply plastered on, being held in position only by the consoles and the marble cornice placed above.[3]

In the same city the Palazzo Publico possesses an external façade wholly of brick with the exception of the ground story. The façades of the courtyard are also built of brick; the piers even of the lower story arcade are of this material.

At San Gemignano, one of the houses surrounding the piazza *de la Citerne*, and which seems to date from the fifteenth century, has a lower story of stone; the rest is red and white brick.

These Tuscan cities, in the province of Siena, were built upon a

[1] Lewis Gruner, Terra-Cotta, p. 29.

[1] Rohault de Fleury, La Toscane au Moyen Age. Paris, 1870.

[2] Verdier & Cattois, Architecture Civile et Domestique au Moyen Age et à la Renaissance. Paris, 1857. Vol. I., p. 27.

[3] Verdier & Cattois, Arch., etc., Vol. I., p. 51 and following.

soil which lent itself marvellously to clayworking; therefore all, with the exception of Florence, which could easily procure stone of all dimensions, have their older portions almost wholly built of brick, with ornamental work in terra-cotta.

We will not leave the peninsula of Italy, which furnishes us with so many valuable records for the study of this particular subject, without mentioning the brick buildings of Asti, very remarkable for their severity, their great simplicity, and the happy choice of methods in their construction and decoration. The cathedral, notably, is a peculiar example of the combination of brick and stone.

Let us pass to the countries neighboring to Italy. The southern provinces of France are localities still containing most interesting specimens of brick construction during the mediæval period; and among these examples we cannot mention a more beautiful one than the old convent of the Jacobins at Toulouse, a building which dates from the end of the thirteenth century. This monastery, transformed to-day into artillery barracks, comprises a double-naved church, a refectory, two cloisters, a chapter house, a sacristy, and a chapel, named from St. Antonin, now occupied as a stable. All these buildings are of brick, and built with the greatest care. The use of stone was confined to the tracery of the windows, destroyed for some years. The brick arcades of the great cloister are carried by columns of gray Pyrenees marble. The top of the church wall presents on the exterior a most monumental appearance, thanks to a feature which we find sometimes adopted in the religious buildings of this region; a gallery, built of brick, placed just beneath the cornice, allows of going around the building, and is lighted by circular openings on the exterior; on the interior side this gallery is pierced with small glazed windows through which the vaults can be examined. This "way of the rounds" is carried upon arches, also of brick, springing from buttress to buttress. But the tower which rises on the north side of the church is still the most original part of the building; it is there that we notice the new methods used by the architects of this period,—methods modified by reason of the very nature of the materials put into the work. This tower,[1] built upon an octagonal plan, is wholly brick, except the belt courses, gargoyles, capitals, and pinnacles, which are stone, and the columns in the upper balustrade, which are marble. Of the five stories into which the tower is divided, the last four are pierced with double windows having triangular-shaped tops. Fig. 2, which represents one of these windows, explains this peculiar arrangement, which the use of a single shape of brick in the whole construction gave rise to. Only the bricks in the arches of the upper balustrade are moulded to arch shape.[2]

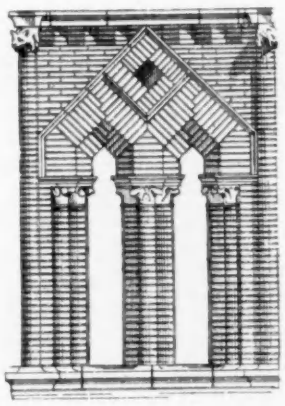


FIG 2.

We will notice that the tower of the Jacobin convent is not crowned with a spire, while we find towers surmounted by octagonal pyramids of brick, at Toulouse even, at Caussade, and at Montauban.

Among the religious buildings of the Gothic period which Toulouse contains is the church of the Cordeliers, wholly built of brick, and the church of Taur, which has a brick gable, pierced near the top by a double row of windows arranged like those of the tower of the Jacobins.

The capital of the department of the Tarn, Alby, possesses, like Toulouse, very interesting buildings of the class we are considering. The church of Saint-Salvi, the building of which was commenced at the end of the twelfth, and continued during the thirteenth century, has its nave all brick, and a tower the top of which, flanked by a battlemented tourelle, is of the same material.

[1] For a full view of this tower, see page 138 of Corroyer's Gothic Architecture, English Edition (Macmillan & Co.).

[2] Voillet-le-Duc, Dict. Raisonné de l'Architecture Française, Vol. III., p. 394.

The cathedral of this city, started by Bernard de Castanet in 1282,[1] consecrated in 1480 under the invocation of St. Cecilia, and only finished in 1512, is one of the most important pieces of brick construction existing. This building, recently restored by M. César Daly, presents in its *ensemble* a regular mass, dominated by a colossal tower. Excepting the window tracery, the balustrades, and the choir screen, which are stone, the whole construction is brick, measuring 13¾ x 10⅝ x 2 inches.[2] This material, blackened by centuries, has resisted the effect of time, like the most durable stone.

"The general effect produced by the exterior view of the cathedral of Alby," says M. Hippolyte Crozes,[3] "resembles in no way most of the buildings of this period. The solidity and bareness of the masses which make up the structure, the gravity of the style, bearing imprint of heaviness, excite feelings neither of deep admiration nor of surprise, but only that degree of interest which severity of line and grandeur of proportions give rise to."

The walls, forty meters high, are smooth, and flanked at equal distances with buttresses semi-circular in plan. These tourelles, so to speak, give to the building (Fig. 3) the aspect of a military work.[4] Prosper Mérimée, struck by the circular form of these buttresses, which he says are without example in France, has thought that the architect, distrusting his materials, wished to avoid sharp angles, which are the first to deteriorate. It seems, meanwhile, more natural to believe, according to a generally accepted tradition, that the original plan was to raise all the buttresses above the roof and make tourelles of them, as the architect charged with the restoration has understood.

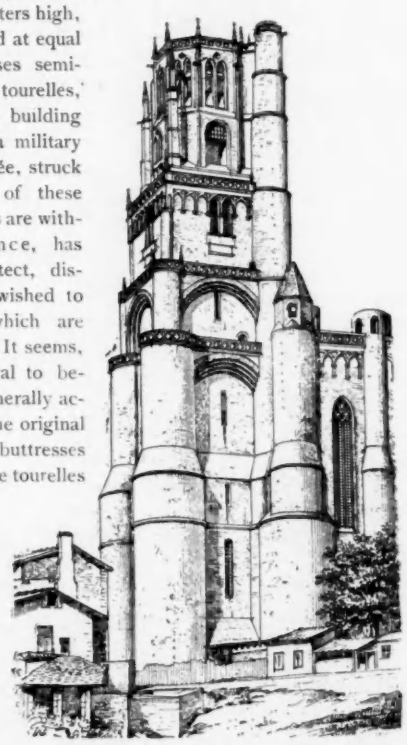


FIG. 3.

At the western end is the tower or donjon keep, flanked by tourelles, two hundred and fifty-eight feet high, quadrangular at its base, and gradually receding to give place to open-work galleries of stone. "It is," says Prosper Mérimée, "the highest pile of brick we know, with the exception of the South American pyramids."[5]

We see at Simorre, in the department of the Gers, another fortified church, of the sixteenth century, which is all brick, except certain door frames and window traceries. Some courses of stone also occur in the sloping tops of the buttresses. Fig. 4, made after a drawing by Viollet-le-Duc, shows the condition of this charming building before the restoration by M. Laisné. As in the religious edifices, brick construction was at that time used frequently for civil buildings and dwellings.

At the Capitole de Toulouse, which serves to-day as the city hall, the old donjon, now restored (Fig. 5), is built of brick, except the window frames and the foundation, which are stone.

In the same city, the college Saint-Raymond, a building of the

[1] Girault de Sainte-Fargeau, Dict. Géographique de la France.

[2] C. Daly, Revue Générale d'Architecture, Vol. XV., p. 248.

[3] Notice sur l'Eglise Métropolitaine d'Alby. Toulouse, 1841.

[4] The cathedral of Alby is not, however, the only southern church which could, if need be, serve as a fortress; the same was true of the cathedrals of Narbonne and Béziers. See Viollet-le-Duc, Dict. Raisonné d'Architecture, Vol. I., p. 380.

[5] Notes d'un Voyage dans le Midi de la France. See also Hippolyte Crozes, Monograph de la Cathedral d'Alby, Third Edition, Vol. I. Toulouse, 1861.

fourteenth century, of which Fig. 6 is a perspective view, is of rectangular plan, with tourelles starting from corbels, at the angles. All the masonry, including, the machicolations and battlements which crown the face of the building and the gables, is brickwork; the lintels, mullions, and sills are stone. Numerous houses in Toulouse, Alby, Caussade, etc., bear witness in their construction of the use of terra-cotta. Viollet-le-Duc, in his "Dictionnaire Raisonné de l'Architecture Française,"[1] gives the elevation of a house in Caussade (Tarn-et-Garonne) in which the bases of the ground floor piers, the little columns in the windows, the belt courses, and the skew backs alone, are of hard stone; the rest is brick.

FIG. 4.

Some words remain to be said upon the dimensions in which this last material was used. The bricks in use in the south of France were ordinarily 13 x 9¾ x 2⅜ inches, and the mortar joints were often from 1½ to 2 inches thick; but these proportions were sometimes far exceeded: thus, the brick used in the construction of the bridge of Montauban, built in the fourteenth century, are 15¾ x 11 x 2 inches. As to the use of ornamental terra-cotta, very widely spread as we have seen, in Italy, it is reduced in the localities we have just gone through to little modillions placed sometimes in the cornices, and to simple mouldings such as the cavet or quarter round. To obtain décorative effects, constructors preferred cutting brick, placing them diagonally, their corners projecting, or by alternate courses, on end, edgewise, or flat.

In the central and northern parts of France the dominating building material was stone. Brick was used only as a filling for half timber work, a use frequent during the fifteenth and sixteenth centuries; placed in different ways, they formed a variety of designs, which contributed to the ornamental effect. We will mention the houses of Verneuil (Department of Eure), which Verdier and Cattois have restored.[2] One of these houses, built in the fifteenth century, shows, upon almost the whole of its façade, a checker pattern of white stone, brick, and black flint alternating symmetrically. The other house, which dates from the century following, also shows a checker pattern of stone and of bricks placed in every fashion (Fig. 7).

At Lisieux we again find some houses of the sixteenth century, of half timber work, and a filling of brick, set perhaps flat, perhaps on end. In the city of Tours there is a very curious house, of brick and stone, dating from the fifteenth century, and known under the erroneous name of *maison de Tristan*.[3] All the walls are of red brick; stone is used for the lower story, and the framing of the openings, except in the arch of the door and the windows of a tourelle which flanks the building; the stairway enclosed in this tourelle, of which we give a perspective view (Fig. 8), is of the greatest interest: the newel, 16¾ inches in diameter, and the sloping vault, are brick like the walls forming the stair well; the stairs, both treads and risers, are brick.

The hand rail, built into the courses of the wall, is alone cut stone. The bricks used are 9 x 4½ x 2⅛ inches. We see that the builders of mediæval times knew how to overcome the greatest difficulties in masonry, with materials that seemed unfit for work of this kind.

Here, then, brick is used for the construction of ramped vaults; we will find it applied to the filling in of floors in a house about the end of the fifteenth century at Chartres. In this house, cited by Viollet-le-Duc[1] there exists a ceiling furnished with beams set with surfaces at an angle with the horizontal, and built into the walls, the spaces between them being filled by brick arches. This particular use of brick or terra-cotta, which many believe modern, is not, then, anything new.

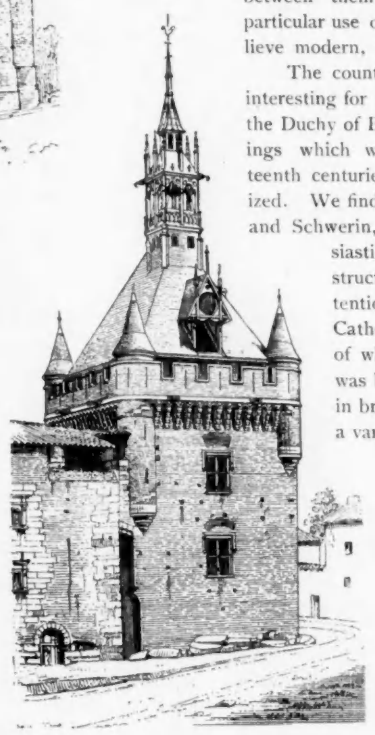


FIG. 5.

The countries neighboring to France are no less interesting for their brick architecture. In Germany, the Duchy of Brandenburg contains remarkable buildings which were built from the twelfth to the sixteenth centuries, and in which this material is utilized. We find also, at Marienburg, Lübeck, Dantzig, and Schwerin, curious buildings, secular and ecclesiastic, constructed of brick. Among the structures of this kind deserving the most attention we can mention the church of Saint Catherine at Brandenburg, the richest part of which, the chapel of the Holy Sepulchre, was built at the end of the fourteenth century, in brick of different colors, ornamented with a variety of designs.

Belgium and Holland furnish us valuable examples. Such are the public and private building which the city of Bruges, especially, contains. The belfry, a tower three hundred feet high, which rises above the market and dates from the end of the thirteenth century, is one of the most remarkable examples of brick construction we can cite. Its galleries, beautiful windows, pinnacles, projecting tourelles, the octagonal form of its last story, its upper balustrade, all give to it an appearance of unusual richness. Fig. 9 represents this fine belfry, which can be compared with those of Brussels, Ypres,

[1] Dict. Raisonné de l'Architecture Française, Vol. VII., p. 205.

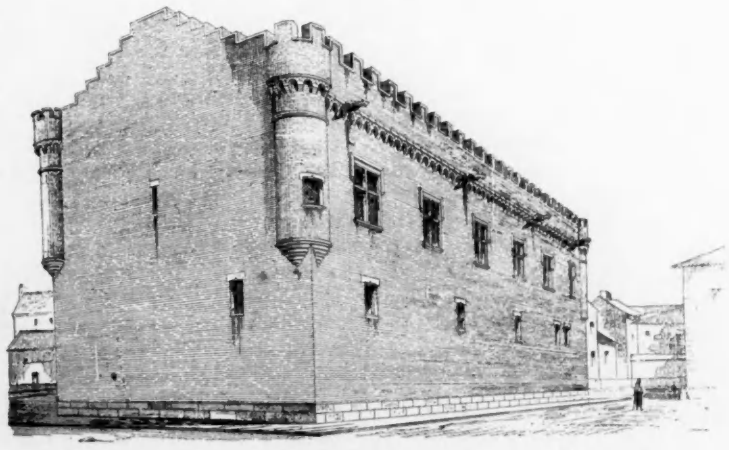


FIG. 6.

[1] Vol. VI., p. 235.
[2] Architecture Civile et Domestique, Vol. II., p. 116 and 123.
[3] See Mame, La Touraine, p. 93.

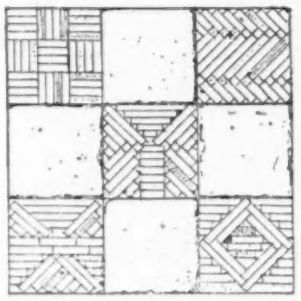


FIG. 7.

Ghent, Niewpoort, and Alost. A very curious use of brick also occurs in the lateral façade of the Bruges city hall.

We can also mention as interesting pieces of brickwork, in this same city, the south gable of the transept of the cathedral, constructed at the beginning of the fifteenth century; the eastern façade of the *hôtel de Grunthuuse*, of almost the same period; the consular residence of the Eastern nations, built by Jean van de Poele in 1478,[1] and a great number of private houses, built during the sixteenth century.

At Anvers we must particularly describe the *Halle à la viande*, a large, solid structure, dating from 1501, which can be considered in every respect one of the most remarkable types of mediæval civil architecture;[2] one notices, first of all, the masonry, — of brick, alternating with bands of cut stone.

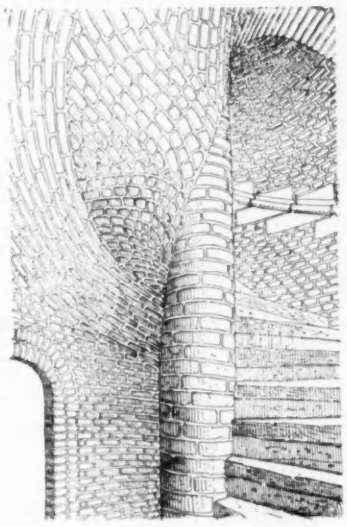


FIG. 8.

In England, a country whose soil contains admirable and abundantly distributed brick clays, the history of architecture shows a considerable break in the use of brick and terra-cotta. The Romans used them up to the fifth century. According to some writers, the Flemmings re-established in England the use of these materials;[3] it is true that at this epoch a great many factories for woollen stuffs were established by the people of this nation, in the country across the channel; but there is no positive evidence to this effect. It is enough to know that brick construction did not come into general use until towards the reigns of Henry VI. and Edward IV., that is to say, in the fifteenth century; from this period important buildings were built of brick, particularly in the eastern counties, and in all parts of England where stone is not common. Little Wenham Hall, built in 1260 or 1280 in Suffolk County, passes for the oldest English building built of modern brick. Caistor castle, near Lincoln, is still a beautiful example of brick construction of the Middle Ages.

THE first of a series of "letters" upon recent brick and terra-cotta work in New York City will also be begun in the April issue. Everywhere in that city one sees brick and terra-cotta used on new work, and it is chiefly in the light shades.

PHILADELPHIA work will be taken up in the same issue, and after next month each city of importance will have a letter at least once every four months.

[1] Verschelde, Les Anciennes Maisons de Bruges. Bruges, 1878. Vol. I., p. 11.
[2] Lonnig, Album Historique de la Ville d'Anvers, avec Notices Historiques, par H. Mertens (p. 51). Anvers, 1868.
[3] See C. Daly, Revue Gènérale d'Architecture, Vol. I., p. 159.

NOTES.

THE capital illustrated below was crowded out of last month's issue, as were the details on pages 41 and 42. These details, with the several plates of scale drawings published last month, give a very good idea of the terra-cotta work.

TERRA-COTTA CAPITAL FROM THE VOLTA BUREAU, WASHINGTON, D. C. MESSRS. PEABODY & STEARNS, ARCHITECTS.
MADE BY THE PERTH AMBOY TERRA-COTTA CO., PERTH AMBOY, N. J.

WE regret that we are again forced to announce the postponement of the first part of our translation of Choisy's "L'Art de Bâtir." The plates, which in the original are steel, require greater care and more time in their execution than was anticipated. We can, however, safely promise our readers that the publication of this work will be begun in next month's issue.

THOSE readers who have been looking for some mention of bricks in our reprint of "Brick and Marble Architecture in the Middle Ages," must remember this is the narrative of a journey. With the next chapter the rich brickwork of Lombardy begins to appear, and then the illustrations will be greatly increased.

THE April issue will also contain a fully illustrated letter from Providence, giving, among other things, several views of the new Congregational Church, by Carrère & Hastings.

THE part of THE BRICKBUILDER following the editorial page will be devoted to departments, the number of which, from issue to issue, will be increased. These will be of a semi-trade or business character, and in them will be found special items belonging distinctly to the trade or business which the department covers. This means that ultimately THE BRICKBUILDER will be a combination of a professional magazine and several trade publications all under one cover, for as each department develops with its particular line of advertisements it will become in itself the equivalent of a separate periodical.

FIG. 9.

OUR subsequent issues will contain valuable matter on paving brick. We would call attention to this as being of special interest to the manufacturers.

BRICK AND MARBLE IN THE MIDDLE AGES.

CHAPTER III.

"Where the mountains
Lift, through perpetual snows, their lofty and luminous summits." — *Evangeline.*

WALLENSTADT, SARGANS, GORGE OF THE TAMINA — RAGATZ — CHUR — EMS — REICHENAU — THUSIS — ZILLIS — ANDEER — SPLUGEN — THE SPLUGEN PASS — THE CUSTOM HOUSE — CASCADE OF THE MEDESSIMO — CAMPO DOLCINO.

THE storm of the evening gave no kind augury of sunshine on the morrow, and with rather anxious thoughts we listened as it roared among the mountains which overhung our hostelry. But it seemed that we had suffered enough, and when we woke we found that, though the clouds had not yet cleared off the sides of the mountains, there was nevertheless every prospect of a fine day.

We were obliged to leave by an inexorably early steamer, at half past five, for Wallenstadt, and so lost all but the suggestion only of the magnificence of the mountains which tower up so grandly over the north shore of the lake. Like Goethe, on his way into Italy, we might exclaim: "What do we not pass over, both on the right hand and on the left, in order to carry out the one thought which has become almost too old for the soul!" But our time was limited, and our chief anxiety to spend as much of our short holiday as we could in Italy; and so, sad though we were to miss what was doubtless so well worthy of being seen, on we were bound to go without delay.

Before we started I had secured a voiturier, whose carriage was at Wallenstadt, to take us on to Chur, so that on this score I had no trouble before me. Our voyage was only too soon made. Unlike the Lake of Zurich, where the traveller rather hopes that each place at which he stops may be the last, on this lake, as the tiny steamer ploughs its way rapidly over its surface with its goal always in view, and with not a place to stop at on its road, he ceases not to long that his pleasure may be prolonged. By seven o'clock we were in our carriage and *en route*. The sun began to shine, and every minute the clouds rose higher and higher, so that, before we finally lost — by turning into the valley of the Rhine — the last view of the valley of the lake, we could see the peaks of the mountains which we so wished to have seen before, the Sieben-Churfürsten, which tower so grandly over the lake.

Wallenstadt is but a poor place, its situation being unwholesome, and its inns not much to be commended. It has a church of modern character, with an old-looking tower in the position of a transept, with a saddle-back roof, gabled north and south. On the lower part of the south side of this tower are paintings of the Crucifixion and some other subjects, apparently of some antiquity. Just above the town, on the right, we passed the ruins of an old castle; and at a slight rise in the road had a beautiful view of the calm waters of the lake, looking blue, but very much smaller than it really is. This, no doubt, is owing to the great height of the precipitous rocks on its north side, which we now saw for the first time, the clouds having at last risen and disclosed some of the beauties which they had been concealing from us.

The valley, from Wallenstadt to Sargans, just beyond which our route, after crossing the very low watershed, joined the valley of the Rhine, was strikingly beautiful. Its ecclesiological features were not, however, remarkable, if I except the constant repetition of what I have often noticed in the Catholic cantons of Switzerland, and in Tyrol, — the occurrence, namely, of grated openings on either side of the western doorway, commanding the interior and protected by an open porch, through which passers-by, though not able to enter, might still see the altar. On our journey from Basel to Zurich we passed a church, the altar of which was lighted up, and the doors behind these gratings left open very late at night. It was in a lonely place, and when I passed there was no one in or near the church. I never see this arrangement without wishing to introduce it in England. There are so many of our churches which cannot conveniently be left always open, and where such a provision might suggest to passers-by, as it does here, the propriety of using a church at other times than those of public service.

The cultivation of this valley is not so uninteresting as its ecclesiology. Here we first found the vines trained about in the horizontal Italian fashion, whilst under them great gourds and pumpkins developed themselves to a prodigious size.

Sargans is a very picturesque old town, and has some capital examples of old Swiss carpentry in its houses; in addition to which there is a picturesque and antique-looking castle, rising high above the houses on a rock, guarding the eastern entrance to the town, and commanding the junction of our road with that of the valley of the Rhine leading to the Lake of Constance.

Our coachman was under a bond to travel as fast as a diligence which lumbered on slowly in advance of us, and as far as Ragatz was quite true to his word; there, however, we determined to pause for a few hours, not willing to pass anything so famous as the baths of Pfeffers without a visit. Leaving our carriage, we mounted a light car, and were soon ascending the beautiful gorge of the Tamina to the baths. The road is capitally made, and follows the windings of the mountain torrent so closely as to require some nerve in those who drive rapidly along on their road to or from the baths. The ascent is steep, but in rather less than an hour we found ourselves at the baths. The rocks rise nearly perpendicularly behind the ledge of rock on which they stand, and the only mode of access to the upper and more wonderful part of the chasm was by passing through the long corridors, which betokened the once religious object of the building. These passed and in charge of a guide, we crossed the torrent by a rude bridge, and then by a rather precarious path made our way, as it seemed, almost into the bowels of the mountain. The gorge is so very narrow that in many parts the light of the sky is no longer visible, the rocks overhanging each other above the head. All the while the torrent is roaring by our sides, and we feel that we are indeed enjoying an excursion into the very heart of the rocky earth. At last we reach the end of the path, are compelled by our guide to ensconce ourselves, one by one, in a small kind of box formed round the source of the spring, — to pronounce it very hot and very nasty (its two most eminent qualities) — and then, still admiring the matchless grandeur of the rocky way, were gain our car and are soon again whirled down the hill to Ragatz.

Our driver is a cheerful, pleasant fellow, talks German much better than the man we brought from Wesen, is communicative, moreover, and seems to enjoy a laugh and a joke uncommonly. Of course we become friends, and with no trouble on our parts, though with some little on his, it is arranged that our old driver shall remain where he is, and that our new friend, proud in the possession of the then very necessary Austrian passport, shall take us on as far at any rate as Chiavenna. A hurried Swiss luncheon — wine, honey, bread and butter — is soon dispatched, and again we are on our way, under the auspices of our new voiturier.

But we must not leave Ragatz without noticing its church, remarkable for its exceedingly good octagonal wooden spire springing in an unusual manner out of a square wooden belfry stage, and another church at (I think) Vilters, close to Ragatz, which has a lofty tower finished on each side with a sharp gable, and a thin octagonal spire rising from the intersection of the cross gabled roof; both these steeples are in a position which for some reason is very popular in this district, — the south side of the chancel.

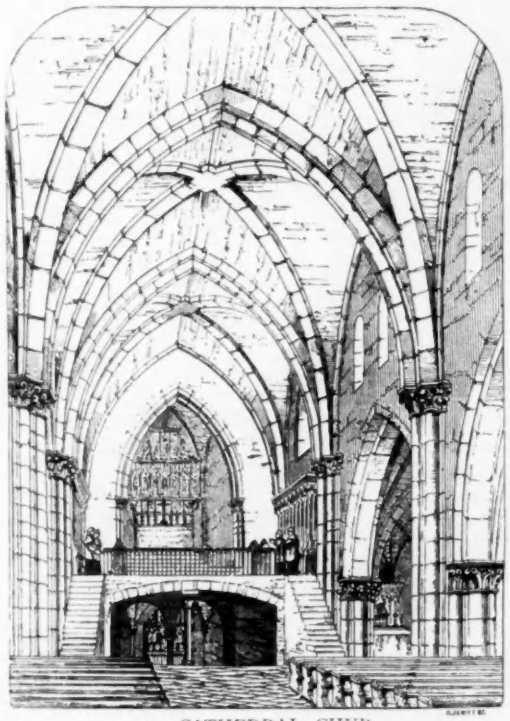
WOODEN SPIRE — RAGATZ.

From Ragatz to Chur the churches are all very similar; they have tall towers generally in the same position as those near

Ragatz, and capped with bulbous roofs, or sharp spires covered with metal. The road is not quite the most agreeable we have travelled; some of the views, it is true, are most lovely, and the mountains — among which towers pre-eminent the grand outline of the Falkniss — are very noble; but, despite all this, the valley is too wide, and the Rhine, by periodical inundations, manages to secure so nearly its whole extent to itself that there is a waste, desolate, and pestilential look in the foreground which is not prepossessing. We arrived at Chur at about half past one, and, not sorry that our horses required rest, betook ourselves to the inspection of this very curious town.

It is entered by old gateways, and many of the streets are still full of ancient houses. The curious feature of the place is, however, its complete division into two quarters — the Protestant and Catholic — the latter walled off and entered by its own gates.[1] It occupies the upper part of the town, and contains in the cathedral church of S. Lucius an attraction for architects which has unusual merit and interest. Its plan consists of a nave of three bays, a choir of one bay raised by twelve steps above the nave, and a sanctuary much narrower than the nave and choir, and also of one bay. The steps from the nave to the choir are narrow and on each side, and between them is a very flat, wide arch, under which access is obtained to the crypt, the floor of which is a few steps below the nave, and extends under the choir and sanctuary. The plan is, it will be seen, not unlike that of the cathedral at Zurich, save that here there are no apsidal terminations at all.

A sketch of the interior of so singular a church cannot be uninteresting, and it will be seen from this that the whole is of the very earliest pointed work, and good of its kind: the crypt is supported in the centre by a column resting upon a grotesque animal. Two of the altars have fine shrines of metal of the thirteenth century, and two other altars have ancient pricket candlesticks, and there are some fine brass standard candlesticks, also; the choir stalls are old, and there is a late triptych behind the high altar, and a very fine Sakramenthaus with metal doors just below the northern flight of steps to the choir, which reminded me of the very fine example in a similar position in the cathedral at Ulm. The altar is of stone of the thirteenth century, with five detached shafts in front, supporting the slab or Mensa. The whole church is groined. It is worthy of notice that the choir makes a great bend out of the straight line, towards the north, — so much, indeed, that it is impossible to avoid noticing it as one enters the church. The steps from the nave to the choir lack dignity. But it is true that if they had been in the centre, and the entrances to the crypt on each side, the crypt would not have been seen, as it now is, from the nave, and a striking effect would have been lost. The west end has a fine, round-arched doorway with several shafts in each jamb, above this, a large window of the same character, and in the gable a small middle-pointed window. About ten feet in advance of the west doorway is a curious remnant of a gateway, with piers and shafts resting upon monsters, looking, however, very much as though it had been removed from elsewhere.



3. — CATHEDRAL, CHUR.

Service commenced just as I was obliged to think of leaving the church; the priests wore red cassocks, and tippets, and very short surplices edged with lace, and looked unclean and untidy; there was no one in the body of the church, and the sacristan, after the service had commenced, walked backwards and forwards about the choir, down the steps into the nave, and then — after a little attention bestowed on some matter there — out of the church. On a subsequent visit to this church (in 1872) I found repairs in progress, which bade fair to destroy some of its great archæological interest.

Descending from the melancholy and squalid-looking Catholic quarter, we soon came upon the Protestant church, dedicated in honor of St. Martin, which is now somewhat remarkable. It is old, but it has been plastered, whitewashed, and then painted by some original artist over its whole exterior, in an extraordinary imitation of all kinds of inconsistent architectural devices; pilasters, cornices, mouldings, tracery, and the like, are all boldly represented with black paint, and in such style that we all stopped the moment we saw it, struck by the conviction that it must be a scene from some play, so utterly absurd, flat, and out of all perspective did the whole look.

The situation of Chur is very lovely, placed as it is just at the point where the Schalfiker Thal joins the valley of the Rhine, and upon the steep and rugged bottom slope of the mountains.

The weather was every moment becoming more glorious, and just as we left Chur, along the road which leads to Reichenau, we had one of the most lovely views we had enjoyed. It is not always the case, however beautiful may be the scenery, or however lovely the weather, that one finds everything grouped together perfectly; here, however, it did, and I commend the subject to the pencils of those who follow me on this route.

We soon reached Ems, whose church, situated upon a green knoll above the village, has the peculiarity of a small apsidal building east of the chancel apse. The key was not to be found, so that I could not go in and examine what this building was. This church had an octangular steeple, whilst another church in the same village had one of the bulbous coverings of which I have before complained. At Reichenau it is proper to go to see the house in which Louis Philippe acted in 1793 as schoolmaster under a Monsieur Jost, and I fear we fell rather in the good opinion of our driver when we neglected so proper and regular a custom; but so it was. The garden of the inn is charming, and from its edge you obtain the best view of the junction of the Vorder and Hinter Rhine, and having enjoyed this thoroughly we passed rapidly through Reichenau, across to its two quaint covered wooden bridges, and by the beautiful meeting of the waters, until we found ourselves following the course of the Hinter Rhine and fairly on the Splügen road.

We only wished to reach Thusis by sunset, and so our time was ample for enjoyment; we walked much of the way, detecting eagerly every here and there patches of snow on the mountains in the distance, each of which is hailed as a discovery by every fresh traveller, who feels himself transported with delight by the distant view of the pure white against the sky.

[1] This division is seen clearly in one of the curious prints by Merian, which illustrate a most valuable and interesting book, entitled, "Topographia Helvetiæ," published at Frankfort-on-the-Main, A. D. 1654, and full of the most picturesque and exact pictures of Swiss towns. They are valuable as proving beyond all question their state in the beginning of the seventeenth century, and as being executed with very much artistic feeling. That of Chur gives the whole town in the most complete manner; the castle, the churches, the walls and the many watch-towers, with the magnificent mountains behind them, making one of the most picturesque *ensembles* conceivable. Many of these views of Swiss towns are remarkable, as proving how very regularly the mediæval towns were planned whenever there was the opportunity — the streets all at right angles, and the great church and market place in the centre of the whole.

Castles are here as numerous as ever upon the Rhine, and at least a dozen, I should think, might be reckoned perched on every favorable spot between Reichenau and Thusis. As the road advances the valley widens out into a kind of basin, into which flow two streams, the one through the as yet unperceived gorge of the Via Mala rather to the right, the other through an opening in the mountains directly in front of us, which allows us a charming view of the snowy heights above the Julier Pass, drinking in the last red rays of the setting sun, long since passed away from the ground on which we stand; then there is a long ascent, and, passing peasants coming in from hay-making, merrily laughing and singing, we drive up the straight, ugly street of Thusis to the Via Mala Hotel. But the evening is too glorious to lose, and in five minutes we are out again on foot to explore the commencement of the black defile; and until we are absolutely turning into it, so narrow is the gorge that it is not seen, but when seen, and by such a light, how grand and beautiful it is! We ascended some distance and then stood and admired. Above us tremendous rocks towered high into the air, riven in two for the narrow chasm in which we stood, at whose bottom we heard the distant roar of the Rhine, and down below and beyond, framed as it were between the grand outline of rocky crag and pine-covered mountain, lay the valley of Domleschg, still retaining, by contrast with the gloom around us, some light upon its fields, and castles, and villages. Rest was well earned after such a pleasant and actively spent day, and, if we were late in starting in the morning, it was as much the fault of our coachman as of ourselves. However, though not so early as we intended, we left soon after six, and in a few minutes were again in the Via Mala. And now by daylight I doubt whether we were not all disappointed; there is so much in a name that one expects something *very* terrific from such a name, and this it scarcely is. It is seldom fair to compare one piece of scenery with another, but still I feel that this certainly was not the most savage I had ever seen, and therefore not justly *my* Via Mala. But beautiful in the extreme it was, and I believe we all regretted that we so soon found ourselves again in the more open valley on the road to Zillis. Here we found a church with a lofty tower, in the same position, and with a spire of the same design, as that at Ragatz; the nave low and ugly, the chancel lofty, with a steep pitched roof and apse; the windows pointed but modernized; the belfry windows of the steeple of three lights, with circular arches, and divided by shafts, which were continued on in blank panels on each side of the windows, so as to form an arcade of five arches on each side. And this I believe was the last noticeable church we saw before we reached Chiavenna, and in its arcaded belfry I fancied that I saw something of an Italian influence at work, which might well have been the fact.

We soon reached Andeer, where we waited but a short time, and then commenced a steep ascent. The lovely scenery, the mountains closing in round us, and the roar of the falls of the Rofla making music in our ears, made our way very enjoyable. There was but little chance, however, of rapid progress, as from Andeer to Splügen the road is almost always on the ascent, sometimes gradually, at others in steep zigzags up the shoulder of some obstructive hill, and constantly overhanging or crossing the rapid, white, foaming mountain stream, sole representative here of the noble river whose broad waters have been admired at Basel. The air of desolation becomes more decided as one reaches Splügen. Trees and shrubs more scarce, and often blasted by the fierce rush of the wintry wind, or the keen, sharp blow of the fallen rock, or the swift sweep of the avalanche, aid in making up the desolate picture. Vegetation has well-nigh ceased, and the eye, though deceived at first by the intensely red color perceived every here and there on the hillsides and on the rocks, discovers presently that not to flowers or plants, but to lichen or other such desolate vegetation, is it owing.

By the time we caught the first sight of Splügen the sky was overclouded, the wind rose, and a sudden heavy storm of rain gave us a lesson in the customs of the weather in these regions, to which our driver's quiet assurance that we should probably have a snowstorm on the pass added the few remaining drops required to make up the draught which we saw ourselves doomed to swallow.

Splügen, however, was reputed to have an inn which would give us enviable shelter for a couple of hours, and we entered at once, hoping, if we waited, again to see the blue sky before we crossed the boundary between the north and south, — between Switzerland and Italy.

The *table-d'hôte* was just about to commence, and in came a diligence from Milan, and out came the passengers; another carriage, which had pursued us relentlessly all the way from Andeer, came in at the same moment, and down we sat, about fifteen English people, not one of whom had been in the house ten minutes before, not one of them stopping for more than their own and their horses' dinners, and all proceeding in different directions, either on their way home, satiated with travel, or just about to dive like ourselves, in full quest of pleasure and excitement, into a new country. These meetings are always curious, generally amusing, and to the quiet and attentive observer of character not a little edifying. On this occasion there was subject-matter enough, and we found an old gentleman, travelling sorely against his will under the care of an active and thoroughly vulgar wife, some literary old maids of another party, and the enthusiastic damsel of a third, each in their way amusing, and not the less so in that it was necessary to inspect them and part with them so rapidly.

Splügen, in a soaking rain, is not a pleasant place; and as I employed myself in sketching from the inn window the very picturesque old bridge, which gives, all its architectural character to the village, I conceive that I accomplished all that was necessary; and when we got into our carriage again, and, crossing by the bridge, left the Bernardin road to the right, and finally plunged really into the Splügen route, it seemed like a reward for my industry to find the rain cease and the sun again occasionally shine out.

The ascent begins with a series of zigzags, which rapidly carry the road high above the valley of the Rhine, and then, passing through one of the long covered galleries for which this route is famous, it emerges in an upland valley or dip between two mountains, up which it takes a steady course along a road macadamized, by-the-by, mainly with the white marble which abounds here, until, just below the summit, it comes again upon a steep mountain side, to be summounted only by a patient unravelling, as it were, of the intricacies of an endless zigzaging, which at last brings us to the Swiss guard-house and the entrance to the great gallery. The clouds are low and gathering: but still as we see below us white patches of snow every here and there, and above us the blue edge of a great glacier marked with lines of crevasses and fringed with a white edge of snow, we feel that we have really at last achieved the summit. Noisily we trot through the arched gallery, and then, after another slight ascent for a few minutes, we stop and put on the drag, and then down we go rapidly and cheerily, backwards and forwards, occasionally giving a merry tap to some corner post at the turns of the road, in order to let it be known that we, our driver, and our horses, are all of us heartily glad that we are at last on the south side of the pass — no longer the German Splüg*en*, but, as we learn from drivers' notices along the road, the Italian Spulg*a*. A short drive takes us to the custom-house, — not looked forward to cheerfully by those who have met, as we had at Splügen, a man turned back by mistake, and after two days' delay again retracing his steps, — but happily, in our case, passed easily enough, and with an exhibition of the greatest courtesy and civility from the Austrian officer, the mention of whom reminds me of the great change which has taken place in the political status of this country since first I made acquaintance with it. It is a change of no little importance to the traveller, who now goes without let or hindrance almost everywhere, instead of being worried out of his life by troubles about passports which even Austrian courtesy could not make tolerable.

We are soon off again across a drear and peaty-looking plain, with no view of the neighboring mountains, and accompanied along

[1] I grieve to say it does so no longer. When I last crossed the Splügen, in 1869, this bridge had disappeared, and one of iron had been erected in its place. It was a capital example of the skilful carpentry of the old Swiss bridge-builders.

the road by a troop of wild smuggler-like fellows, in broad-brimmed, steeple-crowned hats, loose jackets, knee breeches, and coarse stockings, riding wildly along on rough horses, without saddles or bridles, but every one of them handsome, grand-looking fellows, showing, as they smiled, teeth of the purest white, and more nearly coming up to one's idea of real Italians than any with whom, later in our journey and more in Italy, we happened to meet. Before long, however, we again commenced the descent, and then, after passing through two or three galleries of prodigious length, at last came out upon one of those spots, the view from which, as much perhaps by reason of its associations as for its intrinsic beauty, rests on the mind forever after, as one of the most lovely ever seen. On our right a steep mountain track slopes rapidly and almost perpendicularly down to a narrow valley, whose opposite and no less precipitous side we are about to descend; below us, far down, we see the village roofs of Isola, with its church and Italian campanile; beyond, — and this is indeed the great charm of the prospect, — down the valley, where the atmosphere seems redolent of the South, we see a grandly formed mountain, and again to its right another, but more distant; between these two dim and distant shades lies the lake of Como, beyond them the broad, rich plain of Lombardy; the sun shines forth, and we dream henceforward of that valley looked down upon from the gallery on the Splügen, as one of the brighest prospects of our lives!

We had not gone far beyond the last gallery before our voiturier made good a boast which he had often repeated, of showing us a real waterfall on a grand scale before we parted company, and, pulling up his horses, made us — not unwilling — dismount to look *down* the cascade of the Medessimo. A passage has been formed from the road to a point which just overhangs the fall, and here, securely parapeted round, you look down over a grand sheer fall of some eight hundred feet, in the course of which the torrent which goes to feed the thread-like Lira down below us in the valley, and just now roaring in bold volume underneath our road, loses itself in soft, delicate, and fairy-like spray, and ere it reaches the rock below seems like some delicate mist falling from the sky forever in endless and exquisite change of form. Just beyond the cascade the most wonderful part of the descent, in an engineering point of view, commences, and the road seems really to descend the perpendicular face of the rock, surpassing in boldness most other roads that I know, and affording very fine and varied views of the cascade on the descent. We soon reached Campo Dolcino, a miserable and most dirty-looking village, and were, sorely against our will, obliged to wait for our horses to bait; and then on we went, the sun some time set, and the night dark and cloudy. Presently a storm arose; and without lights, and travelling along a road turning sharp angles every minute, and never losing the music in our ears of the roaring Lira, our lot seemed more wild than enviable; at last we came to a house and tried unsuccessfully to borrow a light, but presently at another house we succeeded, and then guided by a lantern we pursued our way safely enough. I have seldom been out in so grand a storm; the lightning was vivid beyond all that I could conceive; and as at one minute it played about on the foaming water beneath us, and at another, lighted up the whole mountain side beyond with pale and intensely lovely light, flickering, playing, and dancing about in the wildest fashion, I believe we felt half sad when house after house appeared, and at last we entered the long, narrow, and thoroughly Italian streets of Chiavenna.

Another journey took me to Chiavenna at the same time in the evening, in my way north from Como. It was the night of the 8th of September, the Nativity of the Blessed Virgin, and every peasant in his solitary châlet on the mountain side was burning a bonfire in her honor. There seemed to me to be something very touching in this flaming burst of distant greeting from mountain to mountain, and few circumstances have ever brought home more vividly to me the isolation of these mountaineers, than the compensating power of a sympathetic faith which made them thus bid each other welcome by their flaring fires.

G. E. Street.

(*To be continued.*)

THE ILLUSTRATIONS.

Plates 17 and 24. *Drawings by Mr. G. Sicoli of Providence, R. I., of Italian brick windows;* from wash drawings by Prof. Strack. The Palazzo Rocca-Salimbeni at Siena seems to have been a fortified private palace, while the Palazzo dei Giureconsulti at Cremona was a public building, erected, according to the inscription on its façade, about 1292.

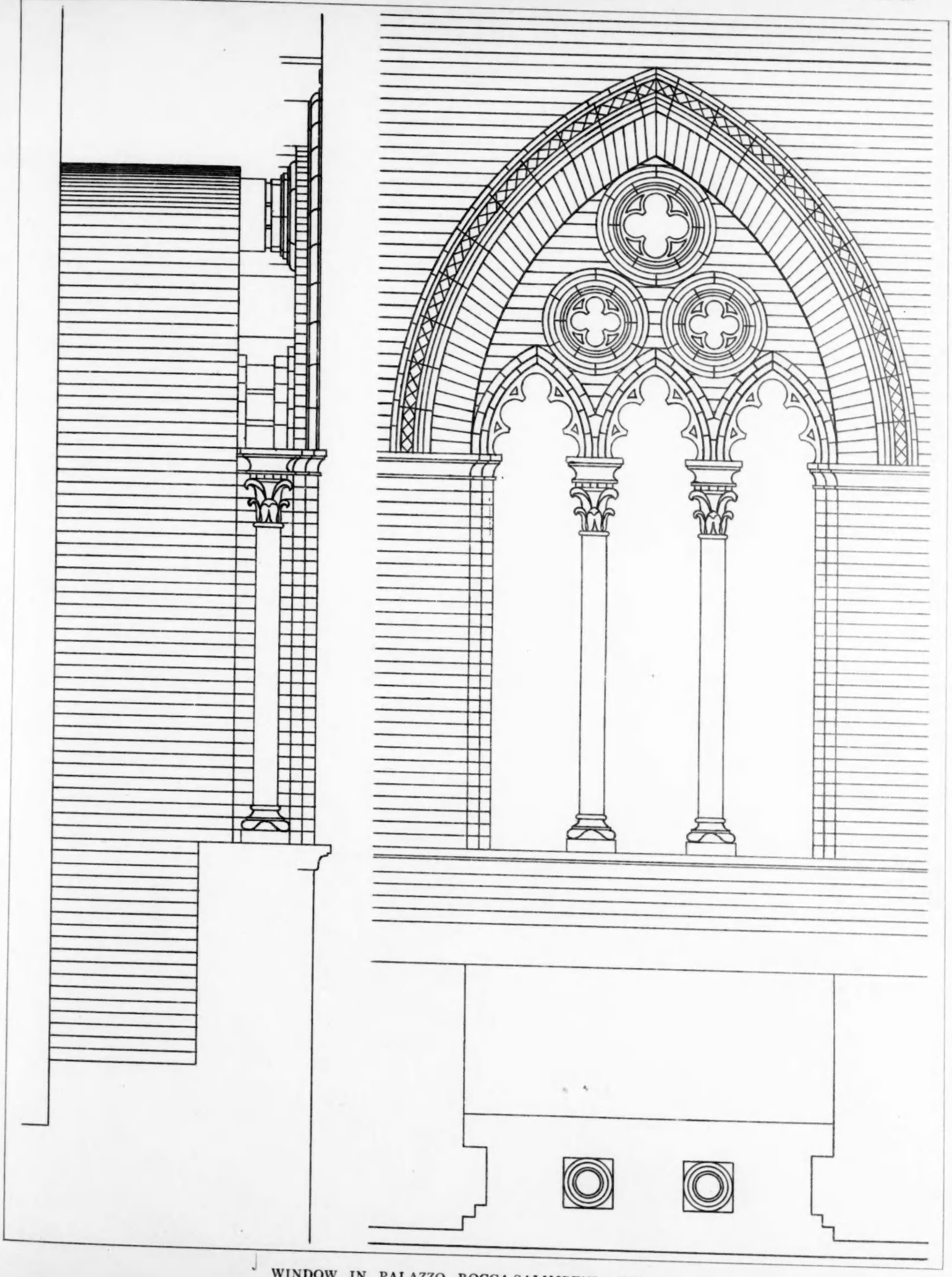
Plates 18 and 19. *New School Building at Greenwich, Conn.*, Messrs. Loring & Phipps, architects, Exchange Building, Boston. These sketches show two different views of this recently completed building. The treatment of the arcaded porch is particularly interesting, and we expect within a month or two to publish a large detail of this arcade.

Plates 20 and 21. *A detail from the Museum of Art, Providence, R. I.*, Messrs. Martin & Hall, architects, Providence.

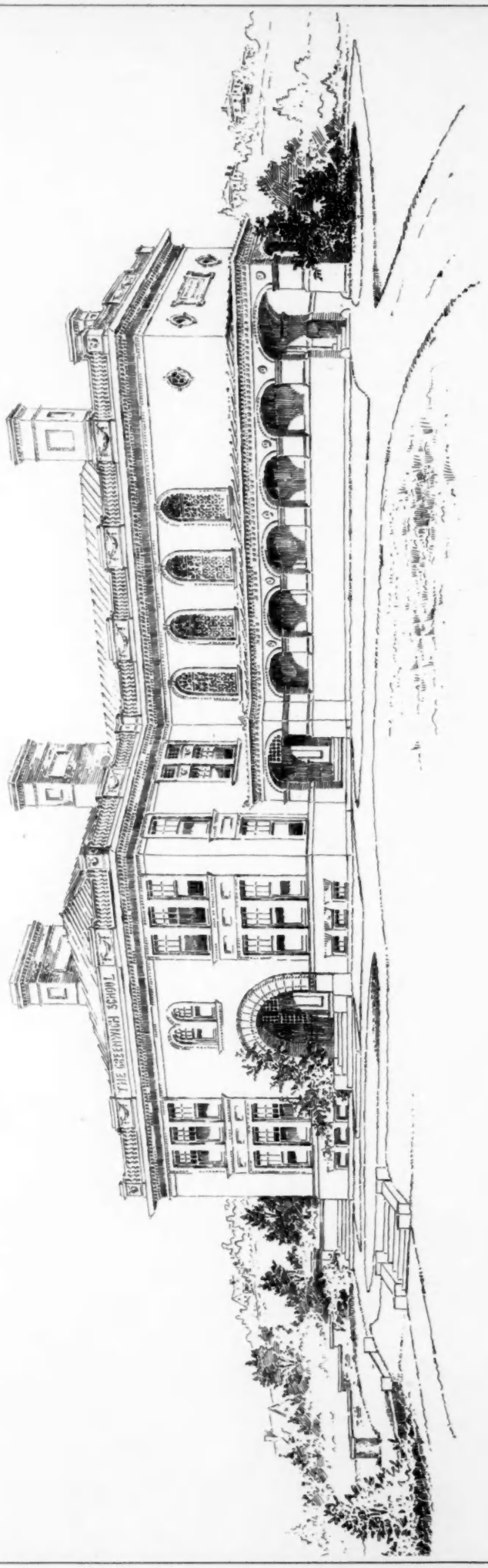
Plates 22 and 23. *Residence of Mr. H. A. Lewis, Philadelphia*, Mr. W. Whitney Lewis, architect, 85 Water Street, Boston.

RESIDENCE OF MR. H. A. LEWIS, PHILADELPHIA.

This residence, of which a photograph is shown above, is a very clever handling of an exceedingly small lot of ground. The photograph gives one the impression of a much larger house. The heavy corbelling of the lower story secures additional room in the upper stories, but it is not the sort of work that an architect, weak in constructive genius, should attempt. The terra-cotta detail is very interesting, and is the work, of course, of Mr. Lewis's own company, — the Perth Amboy Terra-Cotta Co.



WINDOW IN PALAZZO ROCCA-SALIMBENI, SIENA.



NEW SCHOOL BUILDING, GREENWICH, CONN. VIEW FROM THE NORTH-EAST.

LORING & PHIPPS, ARCHITECTS, 1108 EXCHANGE BUILDING, BOSTON.

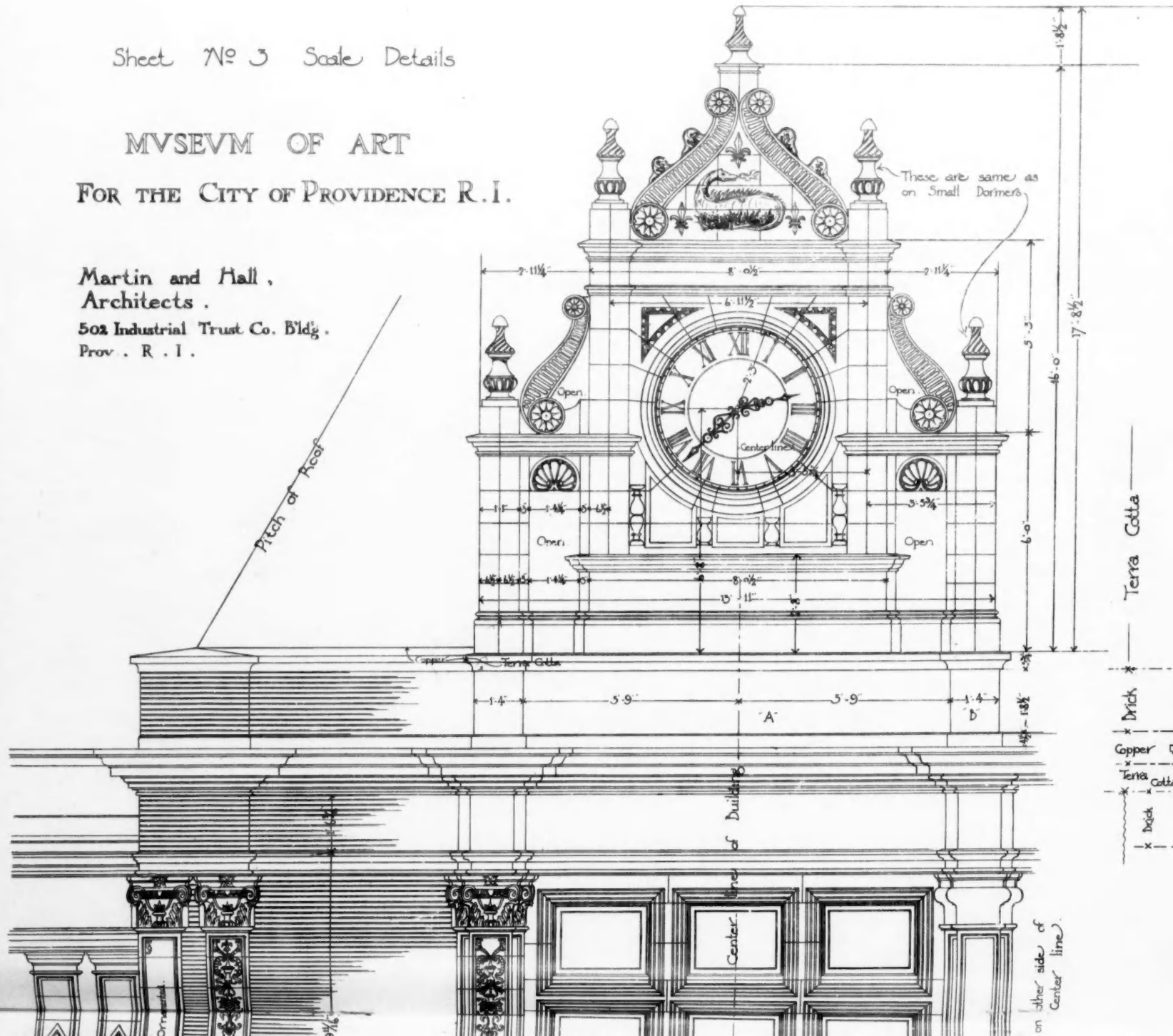
NEW SCHOOL BUILDING, GREENWICH, CONN. VIEW FROM THE SOUTH-EAST.

Sheet № 3 Scale Details

MVSEVM OF ART

FOR THE CITY OF PROVIDENCE R.I.

Martin and Hall,
Architects.
502 Industrial Trust Co. Bldg.
Prov. R.I.



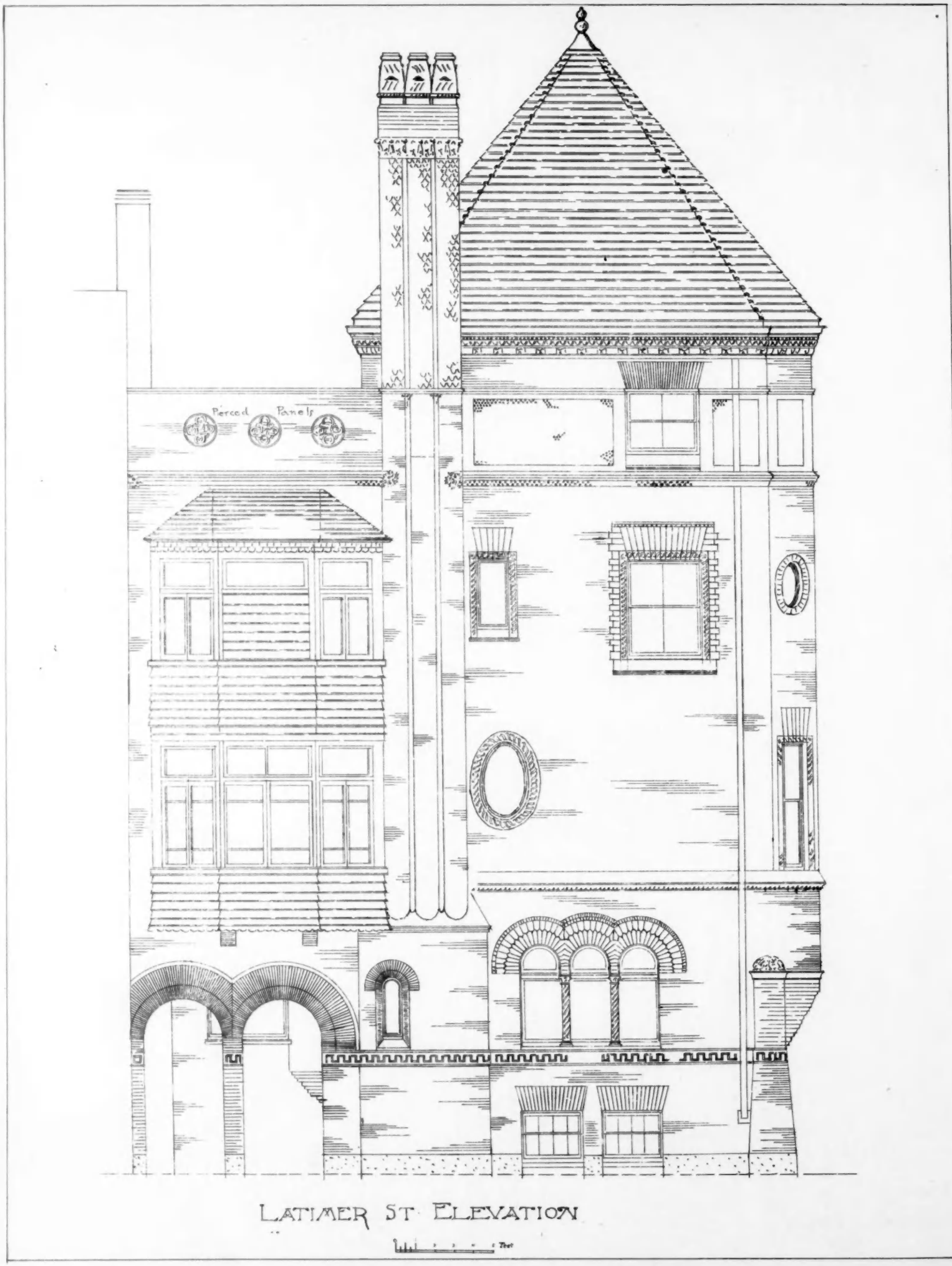
DETAIL FROM MUSEUM OF ART FOR THE CITY OF PROVIDENCE.

Front · Entrance.

Section on Center line

Scale 3/4 inch = 1 foot

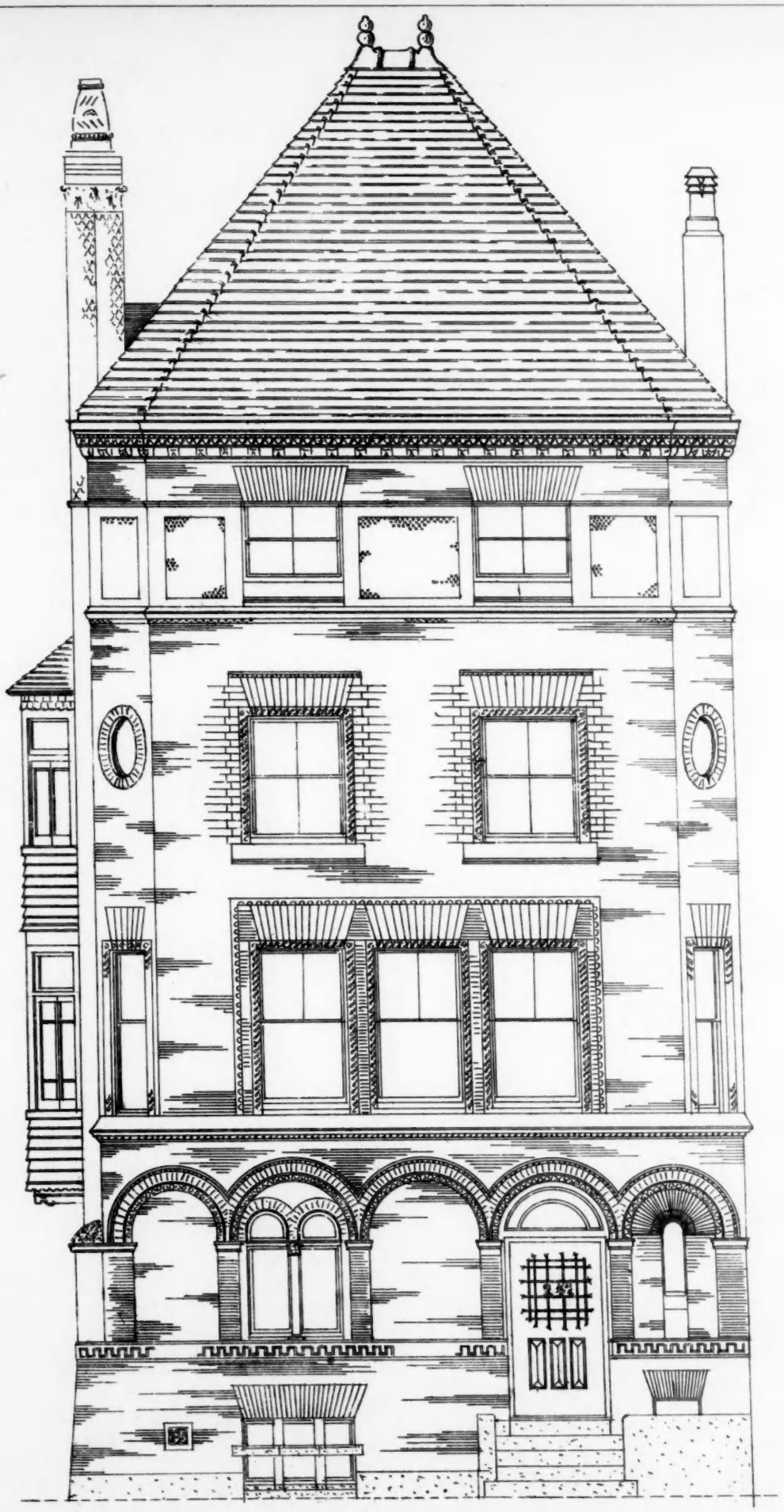
Note Eight courses of brick equals 13½ inches, is taken as a basis for this drawing



LATIMER ST ELEVATION

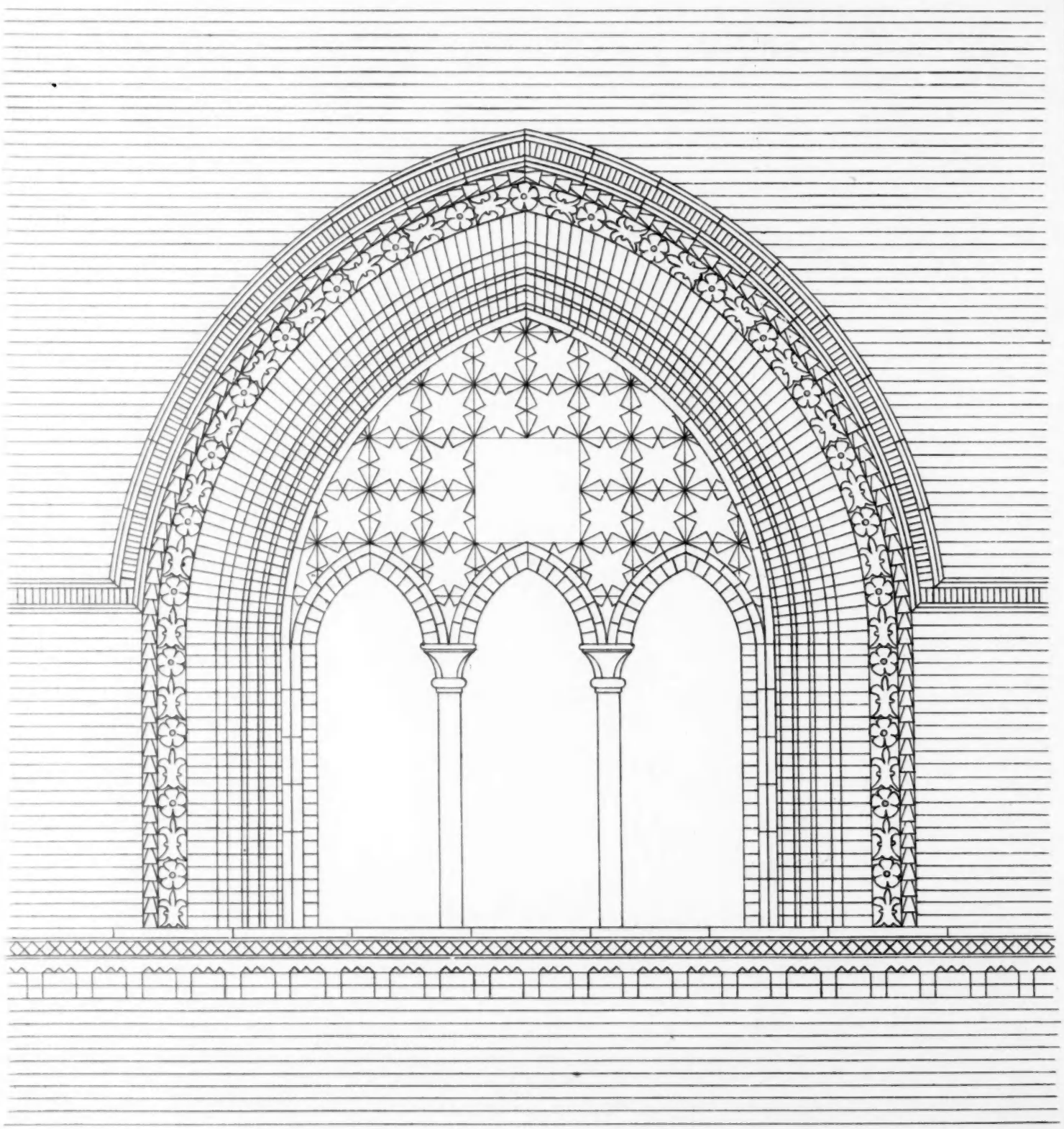
RESIDENCE OF MR. H. A. LEWIS, PHILADELPHIA.

MR. W. WHITNEY LEWIS, ARCHITECT, 85 WATER STREET, BOSTON.



RESIDENCE OF MR. H. A. LEWIS, PHILADELPHIA.

MR. W. WHITNEY LEWIS, ARCHITECT, 85 WATER STREET, BOSTON.



WINDOW IN PALAZZO DEI GIURECONSULTI, CREMONA.

THE BRICKBUILDER.

AN ILLUSTRATED MONTHLY DEVOTED TO THE ADVANCEMENT OF ARCHITECTURE IN MATERIALS OF CLAY.

PUBLISHED BY

The Brickbuilder Publishing Company,

CUSHING BUILDING, 85 WATER STREET, BOSTON.

P. O. BOX, 3282.

Subscription price, mailed flat to subscribers in the United States and Canada	$2.50 per year
Single numbers	25 cent
To countries in the Postal Union	$3.00 per year

Entered at the Boston, Mass., Post Office as Second Class Mail Matter, March 12, 1892.

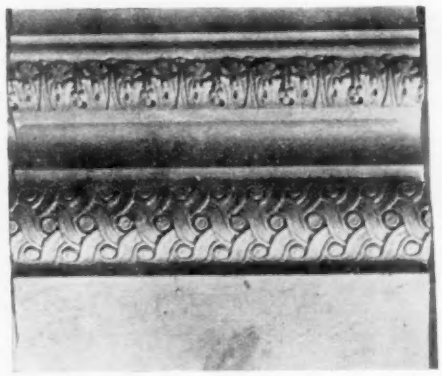
THE BRICKBUILDER is for sale by all Newsdealers in the United States and Canada. Trade Supplied by the American News Co. and its branches.

PUBLISHERS' STATEMENT.

No person, firm, or corporation, interested directly or indirectly in the production or sale of building materials of any sort, has any connections, editorial or proprietary, with this publication.

THE meagreness of statistics regarding the clay industries of the United States is not to be wondered at, when one considers how difficult it is to get the average clay-worker interested in his own business, in a broad-minded way. How many consider that any advantage resulting to clay-working as an industry directly benefits them? or, *vice versa*, what brickmaker, in securing a large order, thinks of the benefit that individual order is to the whole body of brickmakers? It is high time definite statistics of the clay-working industry were compiled, but we would like to see this done by any method short of one similar to census-taking. The statistician who dreams of having blank forms filled out and returned by mail may have hope so long as funds are available for postage, but funds are not without limit. THE BRICKBUILDER is experimenting upon gathering certain statistics, not so much as to brick-making as the brick market. Whether any one of the several methods now being tried will be even partially successful is still a matter for conjecture. But the experience is worth something, and unless some one invents a way that will get returns from more than twenty per cent (the result of Secy. Randall's circular canvass over a picked list), there is considerable room for more of it before the National Association puts good time and money into the work.

THERE is an increasing tendency among architects to use standing exhibits of building materials, and especially of brick. This is very easy to account for, and the wonder is that manufacturers have not been quicker to realize the fact. Every one who is familiar with architects' offices knows how difficult it is to keep them in good order, to prevent drawings from being soiled, and to do away with dust accumulators. A brick is the worse kind of a dust accumulator. Its texture prevents its being wiped or dusted clean, and when one brick is piled on another, the trouble of moving each one to clean it even once a month is so great that it is left alone. One prominent architect in this country, not more than three hundred miles from New York, has recently thrown away his whole stock of samples, because a large manufacturer has established a complete display close at hand. This the architect consults whenever he wants to select a color. There he finds a whole panel laid up, and no man has been allowed since to leave a sample brick in his office. It is much easier for an architect to visit a display where he can see a large variety, than to put up with the constant cluttering of his office. Every new job brings a new set of samples. For some curious reason, however, the old ones are not thrown away. It is soon forgotten who made them, what they cost, etc., so that in case the architect should want to use a certain brick among his old samples the difficulty of placing it is a greater obstacle than calling for a new line of samples. In Philadelphia, in Brooklyn, in Chicago, there are well arranged and managed material exhibits. In other cities enterprising manufacturers make their own exhibits, but to see a reasonable proportion of them requires a great deal of travelling and time from the architect. Would it not be a wise plan for brick manufacturers to coöperate in establishing in central locations an exhibit room where all would have an opportunity to display their brick? It would insure getting a full examination, by the architect, of the bricks in the market, which is seldom the case at present.



BELT COURSE, VOLTA BUREAU, WASHINGTON, D. C.
PEABODY & STEARNS, ARCHITECTS, BOSTON. PERTH AMBOY TERRA-COTTA CO., MAKERS.

THE matter of color in brick and terra-cotta is now so well in control that an architect willing to give a little attention to experimental work can count upon getting from any one of the large manufacturers exactly what he wants. It is often the case that he selects one or the other from some sample at hand, and requires a match in the material which he has not selected by sample. When an architect makes such a selection he should try to get the kind of brick he wants, and let the terra-cotta manufacturer do the matching. The principal reason for this is that in brickmaking clay must be mixed to produce the desired color when burned, while in a piece of terra-cotta the exact color can be obtained by "slipping." The slip is a coating applied by a machine on the principle of the atomizer. A creamy paste of the slip clay is mixed and placed in a receptacle, through the top of which projects a tube running down into the paste. Across the open top of this tube a jet of steam is forced, which draws out the paste and sprays it over the piece of green terra-cotta. When this is done the terra-cotta has a secure coating of the kind of clay necessary to give the right color when burned. This process renders it comparatively easy for the terra-cotta manufacturers to produce the exact shade desired by the architect, so that if it comes to a question of matching one with the other, as is now being done to a greater extent than formerly, let it be the brick that is first selected.

APROPOS of this subject of color, we would suggest that forsaking the hot yellows and fire-flashed brick for the cool pearl grays that several makers are putting on the market would be occasionally a welcome change from what is getting to be monotonous.

How many of our readers are there, who know the Century Club in New York, who would take the warm yellow brick forming the party wall, in preference to the softer gray that is used on the façade and comes in direct juxtaposition with the yellow in the "return" of the façade on the east side? Some of these gray brick, especially Roman size, with a mortar of a slightly darker shade, go charmingly in the plain wall of a building whose trimming is of white or very light terra-cotta.

A "BRICKBUILDER" COMPETITION.

A SUBSCRIBER to this paper authorizes us to offer $175 in prizes for a competition similar to those which have from time to time been given by THE BRICKBUILDER. These we have decided to divide into first, second, and third prizes, of $100, $50, and $25 respectively, open to all architects and draughtsmen, whether subscribers or not. It is probable that several "consolation" prizes in the way of books will be offered by the paper itself.

The programme selected is a very interesting one, and moreover, one that is decidedly practical.

It is supposed that a New York owner of a city lot, forty feet wide and one hundred feet deep, wishes to build thereon a dwelling of four stories, basement and cellar, the material of the façade being brick and terra-cotta. If at any future time he should sell this property, it might bring a better price as *two* houses than as *one*. Therefore a special condition of the problem is that the plans shall be so drawn that the house can at any time, and at a moderate expenditure, be altered over into two dwellings, each twenty feet wide; and in deciding the competition preference will be given, other things being equal, to that set of plans which, while maintaining the unity of the general design, most nearly fulfils this special requirement. Plan of each floor and an elevation to one-fourth-inch scale will be required, and must be sent to the office of THE BRICKBUILDER, on or before June 1, 1894, carriage prepaid. A competent jury of three architects will make the award. THE BRICKBUILDER reserves the right to publish any or all of the designs sent in. Further announcements concerning this competition may be made in the April and May issues.

PANEL OVER WINDOW, VOLTA BUREAU, WASHINGTON, D. C.
PEABODY & STEARNS, ARCHITECTS, BOSTON. PERTH AMBOY TERRA-COTTA CO., MAKERS.

FIREPROOF CONSTRUCTION.

A department devoted to methods of erecting and equipping buildings to prevent loss from fire.

THE MANHATTAN LIFE BUILDING, NEW YORK.
FIREPROOFED BY THE RARITAN HOLLOW AND POROUS BRICK CO.
874 BROADWAY, NEW YORK.

STRUCTURE AND MATERIAL IN HIGH DESIGN.

OF the many problems suggested by the modern high office building, few are more interesting or important than those which relate to the expression of structure and material in the design. In reality this is only a portion of the problem presented by the high building, but it is important enough to warrant some special study apart from the other elements that enter into it.

First of all, however, it is necessary to premise that the high building is something entirely new under the sun. It corresponds to needs essentially modern, the conditions that call it into existence are modern, its system of construction is modern, the elevator service that gives it rentable value is a modern device. Viewed from every standpoint, the high building is wholly new.

Now, it is clearly reasonable to maintain that in attacking a new problem neither the architect nor any one else is bound to hamper himself with ideas and methods that, in their origin, are applicable to old things. Up to within less than twenty-five years ago the architecture of the world has been a horizontal architecture, into which width entered as the leading element. The modern office building is essentially vertical. This is another new element in the problem, and which further most unmistakably suggests that the vertical treatment is the only rational system on which to design a high building, — a system, by the way, that Messrs. Adler & Sullivan entirely understand, and which they have applied with enormous success to their Schiller Theatre in Chicago and to their Wainwright and Union Trust Buildings in St. Louis. I am not, however, concerned with the general question of the artistic treatment of the high front, but only with that portion of the problem that relates to the expression of construction and of material. It is, however, well not to divorce this portion of the question entirely from the general problem.

The high building being entirely new as a building, and in the method of design, the architect who would correctly and successfully solve the problem of its artistic expression must begin his task by ridding his mind of all preconceived notions. When one undertakes to learn a foreign tongue one only recalls one's native tongue sufficiently to help him in his studies. One does not quarrel with a foreign speech because it has not the grammar and methods of one's natural speech. So in the high design, the architect may check his work, as it were, by the experience he has gained in the studies he has hitherto made in low or horizontal design, but it is entirely a false notion to assume that the rules and methods learned in one are to be applied to the other. One does not take Gothic ideas for Renaissance designs if one would produce Renaissance work. So while the architect need not forget all he has learned in other work before beginning his high design, he should most emphatically keep well in mind the fundamental fact that he must not hamper himself in his new work by his previous knowledge.

"Structure in design" is a broad and general statement. If we build walls of rubble work and cover them with plaster, we get the structure on which the larger part of Egyptian architecture was based. If we use another style of decoration, we have the basis of Greek wall treatment. If we use columns and entablatures to face our rubble work, first covering it with slabs of marble, we have the basis of Roman art, and the same process was used by the Byzantine builders. Not until the Gothic period was the structure of the building freely, frankly, and openly expressed in the design. Yet no one thinks of complaining of the Egyptians, the Greeks, the Romans, the Byzantines because they did not wholly show the stones of the cores of their walls on the outside. No one quarrels with a wall ten feet thick faced on the outer surface with fine polished stones, but inwardly of rubble and cement. It is true the Romans went further than this, and that their outer thin marble veneers were a system of deceit more

deliberately practised than the world had previously seen. But if we do not like it we may moralize on it briefly, perhaps, and then pass on to admire the great and splendid works produced in it. The single point to remember, and it is interesting in itself apart from its application to the modern high front, is that construction has been more or less covered up in architecture until the Gothic period. If this be the true test of sound architecture, then there has never been a true architecture save the Gothic.

The truth is, there is a point beyond which the demand for construction cannot be pushed, and becomes not only unnecessary, but absurd. So far as the contents of walls and of supporting members are concerned, there is a long array of precedence that tells us it does not matter much what is in our walls if they but stand upright and perform the functions for which they were built. It is well to keep this in mind, since there is a prevalent notion that until the construction of the high building is expressed in the façade we can have no good design, and that the "solution" we are all anxiously awaiting for can never be reached until this is done. The history of architecture shows this condition never to have existed in the past save in one instance, and if precedent is of any value at all it implies that this strange, new notion — for that is just what it is — shall not now be erected into a cardinal principle. All that architectural history teaches us in this connection is that *structural lines* are followed in the finest examples of the most successful styles. And this is all we need in the high commercial design.

Current architectural practice tolerates a considerable variety of methods for use in the high building. There is, first of all, the steel skeleton system, in which all the loads and walls are carried on a steel frame, and the walls themselves are mere curtains. Then there is the brick or stone construction, in which the walls carry the weight of the building without the assistance of a steel frame. Lastly, there is a mixed system, in which both the steel and brick construction are used, the former for the interior of the building, the latter for the outer walls, or exclusively for the façade. Purists will doubtless insist that the steel skeleton is the only proper one to use, since it is the most logical. In this they may be right, though the matter is perhaps more one of expediency and of circumstance than to be decided by off-hand rules.

Unquestionably, however, the high building is naturally a steel construction, so far as present methods seem to go, and this being the case the wiseacres maintain that until this is expressed in the design we can have no good and successful design, thereby insisting, we should note, upon a limitation that has never yet been insisted upon in architecture save in the Gothic.

Iron is a new building material. As yet we have scarcely done more than begin to learn its architectural properties. Not very long ago it was the custom to build iron fronts, and most horrible things they were, in their simulation of stone. This fashion has, fortunately, almost disappeared, and, instead of putting our iron on the outsides of our building, we put it inside, where it will do the most good, and where, as an accessory, it naturally belongs. Thus it was that an iron building of twenty-five years since was wholly iron externally, while the steel-construction buildings of the present day give no hint of steel in their exteriors. And it must be in one or the other place, inside or outside; there can be no middle course, for the moment we place our iron, part outside and part inside, we have a condition of architectural intolerableness.

I am quite ready to admit, were argument necessary, that the first attempts in iron construction were not fair from the standpoint of artistic design. The architects of a quarter-century since were not the students that now form the body of the profession. Architectural art in general was scarcely understood, and architectural art in a new material not at all. It was, therefore, perhaps natural that iron buildings should have the form of stone ones, and it is quite as natural that they failed. A new material implies a new method of use, and finds its natural forms in new uses. Applied to a store front, it was a new material in an old place, and was early destined to failure. The fact that iron can be moulded like brickwork or stone, and that brick and stone can be imitated in it, in a measure, is no reason why it should be done. The mere ability to do a thing carries no virtue with it. Nor are we to conclude that, because a higher grade of culture and the possession of new devices and modes of working enable us to create a new form of building material, we must henceforth discard the old and take up with the new. Rather a more rational procedure is to use the new to help the old, as nature does in her every phase. Then will the product of the later culture be an advance on that of the earlier, and the law of natural progress be satisfied. And this is exactly what happens when the steel skeleton helps the brick and stone walls of a high building by carrying its weight.

The structural steel columns being encased in piers of terra-cotta, the utmost requirements of construction and of art are obtained. The structural lines are maintained; the piers not only seem to be piers, but are piers. History calls for nothing else; why should the modern architect, battling with the most difficult problem ever presented to any architect in any time, — the high problem without proportionate width, — try to complicate his task by following arbitrary requirements that were never insisted on before? The integrity and expression of the piers are marred, not by hiding the steel core in a facing of terra-cotta, but by running horizontal lines across them, by interrupting their upward tendency, and endeavoring to reduce their apparent dimensions. All these things are being done, but because they are done does not make them right, even when done by those who should know the right way of doing things. Verticality, in truth, is not only the natural and rational method of high design, but it is the only way in which the structure can appear in it. All architecture teaches this, and though in the high design we must throw away many things that past work makes clear to us, we are not called upon to cast aside principles that will help us. If we would rid ourselves of old ideas that we cling to only because they are old, we must do so with a reason and not from pure zest for novelty.

Such is my comprehension of the problem of expression of material in the high design. It is, perhaps, a not unnatural thought that material and structure should have direct and visible expression in the design of the modern brick-and-steel or steel-and-terra-cotta high building. But the history of architecture gives us no authority to insist on this point, and, while purity of expression and honesty of construction are always to be recommended, there is neither sense nor use in asking for something the conditions of building do not permit. Neither theory nor practice shows a clearer way of expressing material and structure in the high design than by a development of the vertical structural lines. The vertical supports are the distinguishing feature of the construction; they are the new elements, and the fact that they support the whole building renders them, in a theoretical as in an actual sense, more important than the horizontal floor lines. We cannot interrupt the vertical lines for that reason, and, for the further one that such interruptions are æsthetically unpleasant, deprive the structure of homogeneity of idea, and introduce discord and division that utterly destroys the unity which is a prime essential in a high design, and which should not be forgotten in horizontal design.

No one will maintain that the skeleton is the highest type of human beauty of form, nor that the general good looks of humanity would be increased by external preponderance of bone. Yet the steel frame is the skeleton of the building in almost exactly the same way that the bones are the skeleton of the human form. What is satisfactory for the one should be satisfactory for the other. When the steel frame is covered with its terra-cotta coating, and when the lines thus formed are expressed in the design, — dominate the design, in fact, — the utmost requirements of reason and of art have been fulfilled. The fact that these vertical lines are generally of greater width than the simple covering with fireproofing would call for does not affect their value nor their expression. An increased width is necessitated by æsthetic requirements, and every designer is fully aware of the advantages he may derive from such width.

The expression of material and of structure in high design will not be helped by arbitrary limitations. Art is by nature free, and it is only when it is held within bounds that it fails to rise to its utmost

height. Commercial design of every sort, and especially the high form, is hampered by innumerable conditions, limitations, and circumstances that render the artistic treatment of the problem one of extreme difficulty. Every additional effort to increase the difficulties of the architect in this work is another step hindering its solution. Instead of limiting the architect, let us give him fair play, lessen his conditions as best we can, and leave him to work out his problem — which is a new one — in a new way. His chances of success will certainly be better than if he were to be told at every point, like some wilful child, that he "mus' n't do this," "mus' n't do that." The noble and manly art of architecture will not thrive under such treatment.

The manifest superiority of terra-cotta for high buildings need not, I presume, be argued; for though the high building is a type of to-day experience has already demonstrated the great superiority of this material in this place. Employed as a fireproof covering to the steel supports, it performs a natural and valuable constructive duty and makes it possible to employ the steel in supporting the weight of the building. Given an external form that permits the expression of the vertical supporting members in an artistic and logical manner, it is doing all that can be asked of it æsthetically. Substitute some other material for the terra-cotta and the net result is the same. The question is not that of the use of materials, at all, but of the manner of design. When the vertical element is consistently handled and with a fine artistic perception of its uses, such as may be seen, for example, in the Schiller Theatre, the questions of expression, of unity, of truth, of art, are entirely and completely answered.

Whether our modern architects have yet wholly grasped the proper use of terra-cotta in the high design may, I think, be most properly debated. The material of the Schiller Theatre, for example, approximates stone almost too closely, and thus has a deceptive effect that the stickler for material may justly criticise if he is disposed to do so. But this is quite a different question from maintaining that the modern high building is a union of two sorts of building material, — steel and terra-cotta, — neither of which has its full and real structural value. What this may be the advocates of "expression" are not always careful to tell us. The argument, however, starts from an illogical basis and is not supported by history. Surely in this case the modern architect need not concern himself with it.

The student of the use of terra-cotta in high buildings has no need to concern himself with the problem of giving structural and visible forms to the two materials that, when naturally employed, stand to each other in the relation of envelope and core. There are many practical points in its use which may be much more profitably discussed than this, and there is much the architect has to learn in its use. Everything that will help to diffuse this knowledge will help the improvement of high design, and that is grievously needed in some quarters. Meanwhile it is sufficient to point out that a considerable advance will have been made when the value of the vertical in vertical design has become generally recognized, and its value in expressing both structure and material is fully known.

BARR FERREE.

THE Powhatan Clay Manufacturing Company announce that Clayville, where their plant is located, has been made a regular freight and passenger station, a postoffice has been established, and the Southern Express Company and Western Union Telegraph Company have opened offices there. The Powhatan Company requests that all communications and shipments formerly marked "Dorset" should now be marked "Clayville," and freight should *not* be prepaid unless so ordered.

ARCHITECTS having special problems in fire-proofing to solve are requested to consult the editor of THE BRICKBUILDER, who will see that they are promptly referred to experts and answered as completely as possible either by correspondence or through the columns of the paper.

THE BRICKMAKERS' MARKET.

INTRODUCTION.

IT is the purpose in this department of THE BRICKBUILDER to take up matters on the market side of the brick manufacturers' business. The technical details of manufacturing are already ably and thoroughly covered by our contemporaries, *The Clayworker* and *The Clay Record*; and they are, futhermore, save in a most general way, beyond our province. THE BRICKBUILDER, being essentially a brick *consumers'* paper, is on that account pre-eminently a publication covering the selling interests of the brick *producer*. It will therefore be the purpose of this department to keep manufacturers in touch with architects and builders, to post them on new shapes, colors, and textures coming into popularity, and likely to be in vogue, and to give timely information as to what the majority of architects will want. In this department attention will also be called to those other parts of the same issue which manufacturers can use in increasing their sales, and suggestions made as to the various ways of using them. Articles upon the delivery of bricks, covering all points in which care is an advantage, will be contributed by practical manufacturers who have given delivery special attention. Local associations, and their success in controlling prices, will form the subject of a series of articles in which both sides will be considered. In this particular department the interests of the average manufacturer will be considered. The several large companies manufacturing extensive lines of front and ornamental brick have each a carefully developed sales system particularly adapted to their special needs. This part of their business is in the hands of men who give it their whole attention and who have years of experience in just this line of work. It is the man who must superintend all departments of his business to whom we hope to make these columns useful, and we respectfully solicit a year's trial, believing we can in that time fully establish our claim to his patronage.

THE MARKET SIDE.

THE first question the intending brick manufacturer asks himself, when he finds he has material at hand, is whether or not there is sufficient market to support a business. In the preliminary work this question occupies a paramount place. Its answer decides the amount of capital required, the character and amount of machinery purchased, the drying and burning facilities, and the numerous minor considerations in the way of equipment. But as the plant is installed, and the processes of production gradually taken up, the interest centres on the technical details as the all-important ones, and there it usually stays. As the years roll by, the manufacturer, providing he is fairly successful and continues in business, devotes more or less attention to the improvement of his plant, changing machinery perhaps, improving or increasing his dryer or kiln capacities, varying his methods of producing and keeping pace with the natural demand for brick. But does he not lose sight of the fact that all improvements leading to increased output are the result of a larger market? The market side again takes precedence. In fact, it is the all-important consideration. There are thousands of good clay beds, the development of which is out of the question. There is no question as to the ability to successfully work them so far as the product goes, but the absence of a market for this product is an insurmountable obstacle to their development.

It may be safely said that in these days the only limit to production is the demand for brick. Machine manufacturers will equip and guarantee any desired capacity of a factory. Is it not, therefore, to the increasing of the demand for their material that manufacturers desirous of building up their business should give their attention? A demonstration of the importance of the market bearing is the recently developed paving-brick industry. Large plants are now devoted exclusively to the manufacture of paving brick to supply a rapidly increasing market. Were it not for the work done by men enthusiastic over this new use of brick in getting it adopted for city pavements, in where would be the occasion for manufacturing? It is

a *new* market and *must* be pushed. Because the use of building brick dates from the earliest days of history, is it so common that at the present day nothing can be done to infuse new life into the industry?

It is the duty every brickmaker owes to himself and to his art to use every legitimate means to secure the use of brick wherever it can be substituted for other materials. He has everything in his favor, except, possibly, cheapness. To offset this, he has both artistic and constructional superiority. If he will only take the trouble, he can present such an array of convincing arguments in favor of his material as to influence any reasonable owner.

There are innumerable instances constantly arising, where the brickmaker might increase his sales by a few thousand here and a few thousand there, if only he were fully alive to every possible use of brick. These sales would be absolutely clear increase, because without his effort brick would never be used.

Is it not, therefore, of equal importance to consider the market side constantly, as the one means largely within control of increasing business. Take care of your market, and your production will take care of itself. The true brickmaker will get work out of the plant at his command, and his balance will be on the right side, *if he has a market*. The finest equipment in the world is without avail, if the market is lacking. But if you can increase the demand, you are justified in putting in new and improved machinery, to enable you more quickly, more certainly, and more economically to supply this demand. If a certain machine will increase your profit by reducing the manufacturing cost per thousand, and if you can increase your sales, there is all the more reason for investing in that machine, simply because it gives you a greater profit on these increased sales, as well as upon the ordinary sales. But if your market is limited, the question is whether the saving on the limited output will repay the interest on the investment and the deterioration of the machine, and give you a balance.

BRICK SCHOOLHOUSES.

BRICK is the material of all materials for schoolhouse architecture, and it is of interest to the manufacturer of common brick to know that some of the finest schoolhouses of the city of Boston are built of good hard common red brick. A schoolhouse must be treated simply. Of the many designs that have appeared in THE BRICKBUILDER, almost all show the simplest possible working out of the design. A fine front brick used under such conditions is apt to give a hard mechanical effect to a plain building that is anything but pleasing, especially as front brick, except in the mottled varieties, are usually sorted for color. Common brick as they run give just enough variety and roughness of texture to a wall to take away the unpleasantness of a perfectly smooth and evenly colored wall. This is a fact now almost universally admitted by architects. In stating it we are aware we are treading on some toes. But to the manufacturer who still believes that brick must always be sorted to an even color, and that for fronts of walls a smooth pressed brick must be used, we would say that the large manufacturers who are producing for the leading architects in the principal cities are offering the widest range in colors, for the production of variety in wall surfaces. A certain large Eastern company offers eleven distinct shades of one color. An architect desiring considerable variety can have them all mixed in; if he desires a more even effect, but with still some variety, he may mix the first six shades if he wants the lighter run of the color, or the last six shades if he wants the darker run. Or he may wish to use a diaper decoration, in which case he can select his shades so as to get just the degree of contrast desired. This is, perhaps, wandering from our subject, but it is introduced to show the universal leaning, in architectural centres, towards variety of color and texture in brick walls. To return to our subject, we want to suggest that manufacturers wishing to influence school building committees to use brick, should write to us, and we will by return mail send them a selection of back numbers of THE BRICKBUILDER containing designs by architects who are specialists in schoolhouse work; every one of these designs is a strong argument for the use of brick, and without any cost whatever to the manufacturer we will place this matter at his disposal. The design, of which two views are shown on plates 18 and 19 of this issue, is a case in point. Many of these designs are out-and-out, common brick designs, while others show combinations of front brick and terra-cotta.

A BRICK INSTEAD OF A WOODEN VERANDA.

IT is not unreasonable to estimate that ninety-nine out of every one hundred brick houses built in this country have wooden porches or verandas if they have any at all. It is even so with many residences of brick manufacturers of which we have personal knowledge. Here is an opportunity for improvement. One of the most effective uses of brick is in the construction of arcades. The piers may be of stone, or terra-cotta, but they may just as well be of brick, with possibly a terra-cotta capital. Such a feature, on a brick house, adds wonderfully to its appearance. It is more expensive, it is true, than a wooden construction, but not enough so as to be considered out of the question except in the most economical construction. A reference to plates 18 and 19 of this number will show the great effectiveness of this treatment of a porch or veranda.

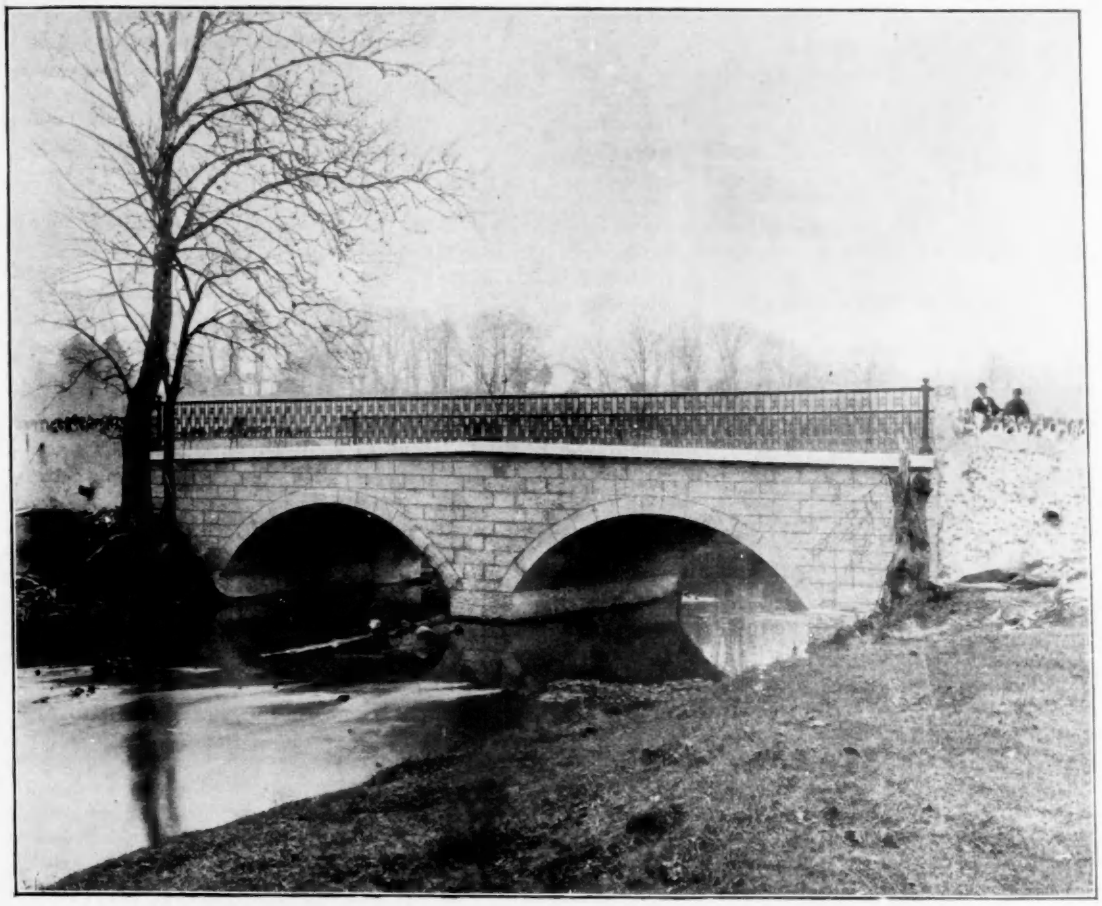
Often it is desirable to have an uncovered porch, and in such a case, providing the house is brick, there is no reason why the porch railing should not be brick.

AN instance where THE BRICKBUILDER has been of service has been brought to our notice by F. Codman Ford of New Orleans, the pioneer of that section in the clay-building materials line. Mr. Ford writes us that features of one of our prize designs for $2,000 brick houses are being embodied in a brick house in process of erection by a real estate improvement company in New Orleans. Mr. Ford has made good use of a number of copies of this special number and at least one copy should be in every brick manufacturer's office, if only to show possible builders ideas for artistic brick houses. These designs were the result of a competition, and a competent jury selected eight out of a large number. Plans, elevations, and details of each design are published in our special double number. It is sent postpaid on receipt of twenty-five two-cent stamps.

BRICK manufacturers who are interested in increasing their local market are requested to write to the editor of THE BRICKBUILDER and offer suggestions of ways in which the paper can be of practical use to them in this direction. Without these suggestions we must do our best and hope to please, but with them as a guide we have a definite basis upon which to work, and we are confident of success.

IT is often that people about to build have some prejudice against a certain material, and outside testimony is required to carry the point in its favor. An instance of this occurred recently, when we received from a Connecticut architect a list of certain issues of THE BRICKBUILDER containing articles upon terra-cotta, with a request that marked copies be sent to the members of a committee, whose addresses he furnished. He was trying to convince them that terra-cotta should be used for trimmings on a brick building, instead of brown stone, and applied to us for assistance. As it is the aim of THE BRICKBUILDER to advance the interests of architecture in clay materials, we want every opportunity to throw our influence into the balance, whether or not the request comes from a subscriber.

LIMES AND CEMENTS, MORTARS, AND MORTAR COLORS.



HIGHWAY BRIDGE OF CONCRETE, OVER PENNYPACK CREEK, PHILADELPHIA.

DESIGNED BY MR. CARL A. TRIK, SUPERINTENDENT OF BRIDGES.

THE above illustration from a photograph represents the newly finished, first cement bridge in America, built by the Department of Public Works of the city of Philadelphia. The following description is taken from the annual report of Mr. Carl A. Trik, the Superintendent of Bridges, who designed and superintended in every detail the construction of this bridge.

"Another successful progress in the construction of highway bridges — a novelty in our country — was created in this city during the past year, upon my suggestion, sustained by the chief of this Bureau, and with the consent of the director of the Department of Public Works, by the construction of a double-arched highway bridge carrying Pine Road over Pennypack Creek, entirely of concrete; foundations, abutments, centre pier, arches, and spandrel walls, all of one solid casting of concrete of the content of 1,008 tons.

"The work was performed under contract by I. H. Hathaway & Co. in best workmanship and with best approved material, according to my design and specifications, approved by the director of the Department of Public Works, at a cost of $8,642 for the entire bridge, including appurtenances; and of $646.12 for thorough renovation of the retaining walls on both approaches.

"Against the cost of $8,642 for the concrete bridge, there stood the lowest bid of $11,300 for substituting a rock-face ashlar stone and brick arch bridge.

"By adopting the concrete bridge, the city saved the more cost of a stone bridge of $2,658 — that is, about 33 per cent of the expense — by comparatively equal durability of the structure.

"The bridge consists of two arched spans, each of twenty-five feet four and three-fourths inches, with a rise of six feet six inches; supported by concrete abutments and a concrete pier; and is built on a light skew. It is thirty-four feet wide out to out of parapets, and carries a twenty-six-foot-wide macadam roadway with two granite-paved gutters on concrete foundation, two feet wide on each side. The arches proper are two feet three inches deep at the crown and covered on top with a three-fourths-inch layer of Portland cement mortar. The spandrel filling consists of compactly rammed concrete. The spandrel walls and faces of the arches are moulded to represent ashlar masonry, and are afterwards pebble-dashed to show a rough surface.

"The abutments are seven feet, the centre pier six feet, and the spandrel walls three feet thick at the springing line and two feet thick at the top under the coping; the roadway lies fourteen feet six inches above the ordinary water surface.

"To strengthen the concrete work, wire nets have been placed on top of each layer, twelve inches square; the diameter of the wire in this netting is one fourth inch.

"One hundred and twelve (112) tons of best imported Mannheimer Portland Cement have been used for the concrete; this brand of Portland Cement was found especially qualified for the purpose of concrete casting on account of its perfect uniformity, intensive fineness, progressive induration after the first setting, and of its great tensile and crushing strength.

"The cement was carefully and well mixed with clean, sharp bar sand and broken hard quarry stone of the specified sizes, and clear water, in proportions varying so as to give the concrete the required compressive strength and resistance of the strains of the various parts

of the bridge; viz., one part of cement to two parts of sand to six parts of broken stone, up to one part of cement to one part of sand to four parts of broken stone; the broken stones were varying in size from one cubic inch to three cubic inches.

"The roadway of the bridge was constructed of sixteen-inch-thick macadam on a hard stone base, with gutters of granite blocks on concrete foundation on both sides, each two feet wide; joints grouted with Portland cement mortar, and grate inlets at each end of both gutters, with pipe outlets built through the retaining walls, to discharge the surface water into the creek.

"When, three weeks after the completion of the concrete arches, the centring timbers of the arches and the other casings were taken off, there was not the slightest settling of any part of the concrete bridge visible; and when, about two weeks later, an eleven-ton roller was used for compacting the macadam on top of the arches for about ten hours, there was also not the slightest settling remarkable.

"On several examinations, after the bridge was transmitted to the use of the public, I could not discover any dislocation or cracking of the concrete structure."

"To Mr. James H. Windrim, Director of Public Works, we are indebted for a description covering the salient parts of Mr. Trik's report, and Mr. Windrim also adds the following analysis of the cement used: —

Moisture	0.17%
Combined Water	1.31
Insoluble Matter	3.15
Silica	18.90
Sulphuric Acid	1.71
Alumina	8.81
Oxide of Iron	2.81
Lime	60.82
Magnesia	1.88
Potash	0.56
Soda	1.35

The following table of average tensile strength of the cement is also furnished by Mr. Windrim: —

Neat.	24 hours in water,	393 pounds per square inch.
	7 days (one day in air),	579 " " " "
	23 days (" " "),	659 " " " "

Per cent of water, 22.8.

A physical test showed a residue of 5.5 per cent on a one-hundred-mesh sieve.

The construction of the concrete foundations, abutments, piers, and arches, spandrel and parapet walls, including the centres and casings, took about thirty-one working days.

NOTES.

CEMENTS showing a high tensile strength at a short period are not necessarily good; they will sometimes fail on a longer test, and are subject to contraction and expansion in volume, greatly injuring the works in which they have been employed. This is due to imperfections in their chemical composition or manufacture.

THE higher prices of some well-tried brands of cement, while a trifle higher than ordinary brands, are compensated for by greater strength, which permits of a larger addition of sand, thus making their actual use really cheaper than less expensive and inferior brands.

THE lime and cement dealers of Boston and vicinity have formed an association. Their first monthly dinner was held at Young's, March 14.

W. H. GATES of Boston has added to his other lines Wm. Connor's American Seal Mortar Colors.

JONATHAN CREAGER'S SONS of Cincinnati report that they have a new machine for the brick manufacturers that will be a winner when they put it out among the trade. From their description it will fill a long-felt want.

TRADE NOTES.

WE had a very pleasant call recently at the yards of the La Salle Pressed Brick Company and found them active in filling orders on special brick. They are getting out some new ideas in cornice designs that are very attractive and have the special feature of being of sufficient size to be effective when in position. We would lay particular stress on this last feature, as many attractive designs lose in effect by being so comparatively small as to be indistinct when set in position.

AT the office of the Cincinnati Pressed Brick Company we also saw some beautiful samples, and were shown equally fine specimens in some of the important buildings of recent erection in Cincinnati; proving that this company exhibits as samples only the sort of stock they expect to fill orders with. The renewal of business activity is being felt in their office, and, judging from the excellent quality of their brick, they will deserve increased sales.

WE are glad to learn from the well-known firm of Evens & Howard, of St. Louis, that the outlook for business has improved the last few weeks. They are receiving many inquiries and orders for their brick. It is not surprising that they should be among the first to feel the renewal of activity in trade. The standard of their brick warrants their popularity. The new catalogue, which will soon be out, is a gem in the way of illustrations, judging from the proof sheets. It has many new and attractive designs that will make it a very attractive reference book. W. H. Gates, at 30 Kilby Street, Boston, can show New England buyers samples of the Evens & Howard goods.

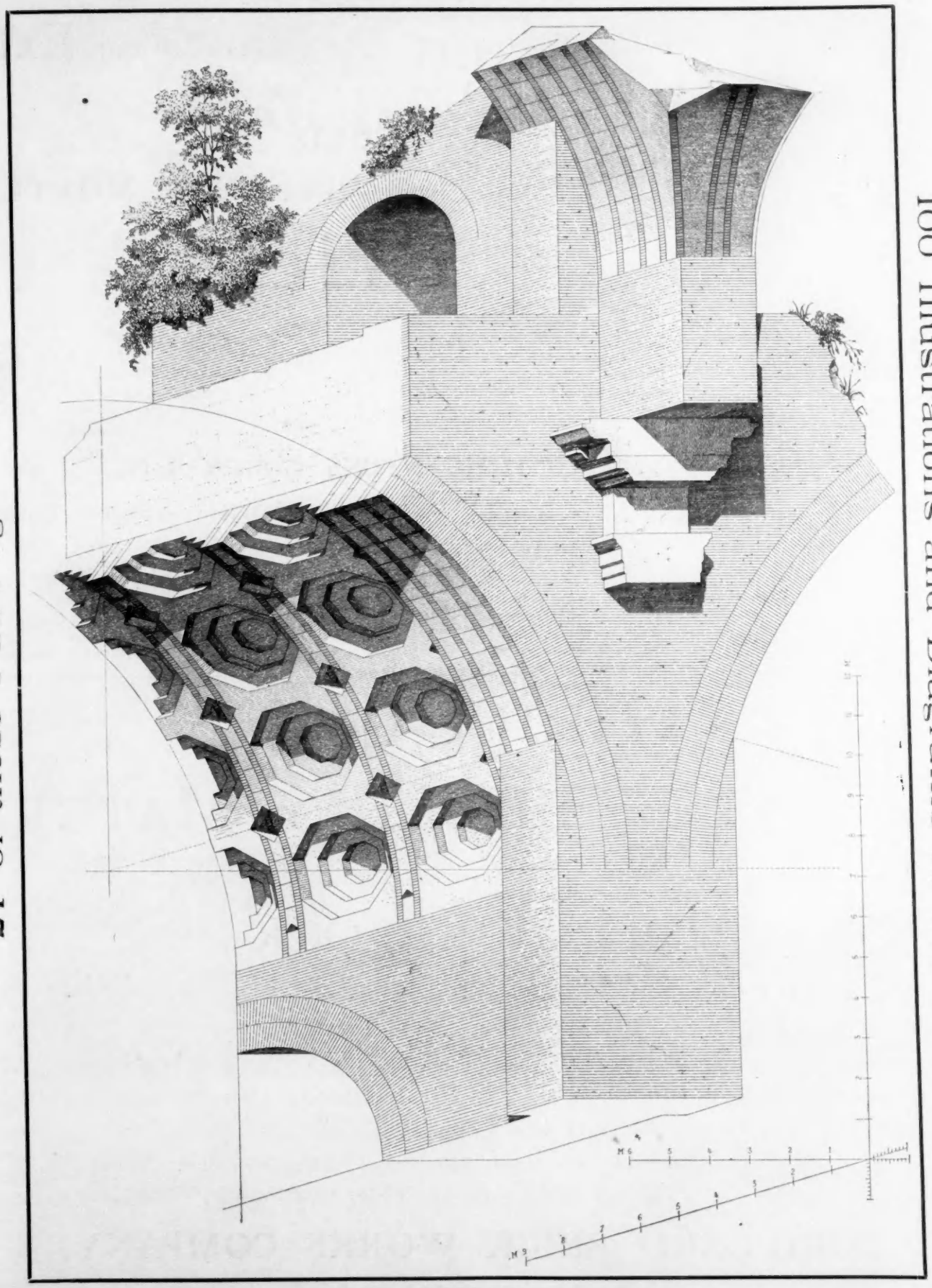
WHILE in St. Louis we had the pleasure of visiting the extensive yards of the Hydraulic Pressed Brick Company. We feel it would be little short of a revelation to some of our smaller manufacturers, could they but see the capacity of these various yards and the improved methods for making and handling brick. We were interested to learn that during the World's Fair some prominent German manufacturers of brick came down to St. Louis and went over the Hydraulic Company's yards. They came down with most exalted ideas of their own methods and systems, but before leaving admitted that they had much to learn from what they saw there. The new catalogue, which will soon be out, will be one of the most complete works of the kind ever issued. All the new designs are of the actual dimensions of the bricks represented.

M. F. WILLIAMS & CO. of St. Louis are getting out some new machinery in the way of a clay mixer and feeder combined that is meeting with great favor among the clayworking fraternity. It has, among other good features, a steam-heated bottom for warming clay while it is being mixed and fed. This is of great value in damp or frosty clays. Another machine that is very popular is their new shale crusher and grinder. This is designed to take shale from the bank in large lumps and reduce it to powder by one process. The manufacturers claim that this machine will do more work than two eight-foot dry pans, and the cost will not be greater than that of one dry pan. Also, that the shale will not be left in a flaky condition, but will be granular and flaky in form.

IN Indianapolis we found the Standard Dry Kiln Company quite settled in their new offices. They assure their friends that they are better equipped for business than ever. We congratulated Mr. Elliot on the evident activity in business at the time of our call, and we trust it may long continue.

THE Simpson Brick Press Company have moved from their old quarters to new and spacious offices in the Chamber of Commerce building. Their new location is certainly a most desirable one. We congratulate them on the increase of business which has made the change necessary. Notice came too late to change their advertisement, which was in the first form sent to press.

A SPECIMEN PLATE.



27 of these Full-Page Plates.

100 Illustrations and Diagrams in the Text.

The above is a specimen of the full-page plates illustrating our translation of Choisy's "L'Art de Bâtir chez les Romains." This valuable work and a reprint of Street's "Brick and Marble," illustrated by over 200 illustrations, which in future will be largely photographs, will be two of several strong features of THE BRICK BUILDER for 1894.

READ OUR SPECIAL OFFER ON PAGE III.